# Railway Age Gazette

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BY a bill presented in Congress by Representative Peters, of Massachusetts (House Bill 19795), it is proposed to authorize the Interstate Commerce Commission to establish branch offices in any leading commercial center of the United States; the agent in charge of the office to be empowered to grant preliminary hearings, to adjust differences arising on questions of freight car demurrage, and to adjust differences on such other matters as the commission may refer to him; all decisions of the agent to be subject to the approval of the commission. Freight car demurrage being specially mentioned, it is probably fair to assume that this bill represents the views of the merchants of Boston, where a demurrage bureau, which is conducted under the supervision, if not the authority, of the commission, has been in operation for about a year past. D. O. Ives, the representative of the Boston commercial interests, is understood to have been one of the chief sponsors of the bill. Whether or not it has any chance of passing at the present session of Congress would seem rather doubtful, as the House committee on interstate and foreign commerce seems to have its hands full in dealing with the bill for the government of the Canal Zone, and the proposed amendments to the Pure Food law. Mr. Thomason, the demurrage commissioner at Boston, appears to have made a very successful record, and undoubtedly an arbitrator might do good in any large city. At the same time we have never heard that any great volume of disputes has come up for settlement at Boston, and it does not seem likely that the railways will be enthusiastic supporters of the proposed law. However, if the commission should put experienced and competent railway men in charge of the proposed offices, the railways not only could have no great objection, but quite probably would favor the change. At least, the New England roads would be rid of the very one-sided condition now existing at Boston—where the railways provide the money and the government holds the control. So far as we can see, the commission might appoint these territorial agents without a word of additional legislation. At any rate, the examiners of the commission in their hearings at numerous cities throughout the country have long exercised such functions as those named in the bill. However, an amendment specially naming some new requirements will be a very convenient lever with which to secure an additional appropriation.

A MAJORITY vote in favor of the "comprehensive scheme of signaling," which has been recorded in the Railway Signal Association, as noted in our issue of March 8, page 441, marks an encouraging step forward; and this in spite of the failure to secure the two-thirds majority which was necessary to put the modern scheme into the signal association's manual of recommended practice. When the scheme was first submitted to letter ballot the progressives mustered only 236 votes, being beaten by a majority of 75, the conservatives casting 311, and leaving the committee 129 short of a two-thirds majority. Now we have 344 votes in favor of the committee's main proposition—Conclusion No. 2, embodying the principles of the scheme—as compared with 230 against it, a majority of 114. We call the present result encouraging because it is a foregone conclusion that progress must be gradual. Already, for new work, enough important roads have adopted the three-position semaphore, the upward inclination and the medium speed indication, to insure their substantially universal acceptance in time—probably important exceptions will remain forever—but an association vote cannot get very far ahead of actual practice; and actual practice will continue to be old fashioned, in old installations, for a number of years to come. Our congratulations at present, therefore, must be on the progress of the idea. The idea is sound and we now have a good body of men who intend to carry it out. Conclusion No. 2, the radical proposition that has required such a long campaign of education, received a majority of 114, as above stated; but even on Conclusion No. 1, embodying the incomplete scheme, the affirmative vote was 20 more than the negative. Evidently some of the majority must have voted for that scheme mainly from a spirit of courtesy. Such courtesy is especially

commendable, for the desideratum now is not so much that the best practice be exalted as that the association shall come to some agreement. Conclusion No. 1 was brought forward for that specific purpose, and it is calculated to accomplish the purpose with the least possible room for inconsistencies in practice. The signaling news in our last issue was important in actualities as well as in theories, as will be seen by a reference to page 423, containing a description of proposed new signals on the Pennsylvania Railroad. Mr. Rudd will not only employ the principle of speed signaling at interlocking on 111 miles of road, but will introduce that principle on considerable stretches of the open road also; this for the purpose of giving two distant indications, each distinct from the other. Thus, in a line extending from A to B, C, D, and so on, with an eastbound train in block C-D, protected by a home signal at C, the ordinary distant indication

will be given at B while at A the signal will indicate "proceed, prepare to pass next signal (B) at medium speed." If a train running at 60 miles an hour is following another, equally fast, and as closely as the signals will permit, and if the leading train is obliged to slacken its pace, the second train needs to be warned so that it can slacken accordingly. With this arrangement this can be done, in many cases, while still there is space enough to admit of slackening without stopping, which conduces both to economy of operation and to the comfort of passengers. Assuming that "medium" means 40 miles an hour, the second train reduces to that speed (and no lower, unless necessary), until there is again a space of two blocks between the two trains. This arrangement makes no trouble for freight trains, for they can put up with the 40-mile limit at all times. A scheme of this kind has long been needed on lines where fast trains are numerous.

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THE Chicago Association of Commerce has adopted an attitude toward the regulation of the tolls and rates to be charged on the ships and traffic passing through the Panama canal, the fairness and reasonableness of which should appeal to all who are interested in the new problems presented by the approaching opening of the canal. In resolutions which have been addressed to the senate committee on interoceanic canals and the house committee on interstate and foreign commerce, the Association of Commerce advocates the imposition of reasonable tolls on all vessels passing through the canal, having due regard to the competition of the Suez canal, and declares against discrimination of any nature either as between American and foreign vessels, or as against any vessels engaged in coastwise trade because of their ownership by railways. Some shippers have demanded that boats owned or controlled by railways be shut out of the canal either by direct legislation or by discrimination and prohibitory tolls. To guard against any danger of a monopoly of the shippers using the canal, or a neutralization by the railways of its anticipated benefits, the association in its resolutions urges that all vessels engaged in coastwise trade be subjected to regulation by the Interstate Commerce Commission. As in the nature of things the opening of the Isthmian canal is destined to be of far greater advantage to the people of the Atlantic and Pacific coasts than to those of the central west, the Chicago shippers are naturally opposed to the granting of virtual subsidy to the boat lines by levying no tolls or making them unreasonably low, thereby enabling the boats to make lower rates than they can if required to pay reasonable tolls. There cannot be advanced any fair argument for granting a subsidy either to the boat owners or to the shippers by the fixing of less than reasonable tolls in a canal built by and for the nation as a whole when the necessary result of such action would be to give a relative advantage to the people on the Atlantic and Pacific coasts over those of the middle west. The Association of Commerce has also made a wise and fair suggestion by advocating the regulation of coastwise traffic by the Interstate Commerce Commission. If American vessels had to meet the competition of foreign vessels in the coastwise trade there would be reason for leaving them free from restrictions; but they are given a monopoly of the coastwise business. Railways have been condemned for and prohibited by law from unfairly discriminating in their rates, while directly competing boat lines engaged in the coastwise trade have been left entirely unregulated, except as to traffic handled partly by water and partly by rail. There is no good reason for subjecting a railway to regulation which prohibits unjust discrimination while at the same time permitting a competing boat line to cut rates and give rebates as it pleases.

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### ELECTRIFICATION OF MAIN LINE RAILWAYS.

THE electrification of main line railways was discussed by William J. Clark, of the General Electric Company, in a paper presented at the March 7 meeting of the Franklin Institute, Philadelphia, Pa. He approached the problem from a somewhat different viewpoint than is usually taken by electrical engineers in discussing this question, and predicted that within a few years the prime reason for electrification will be for the advantageous operation of freight traffic and that the advantages of electric traction in passenger transportation would then be considered as incidental. Attention was directed to the fact that the original introduction of electric traction on surface railways was largely because of its advantages for operating over heavy grades where the cost of cable construction, equipment and operation was prohibitive.

Two surveys have been made within the past few months of a proposed western railway about 160 miles long, which is located in a rough mountainous region. One of these surveys took into consideration the grades that would permit of steam operation and the other those which could be easily and economically operated by electricity. The locating engineers estimated a saving in favor of electricity on 6½ miles of the proposed line, which would be more than sufficient to offset the cost of electrifying the entire 160 miles. Moreover, they estimated that the expense of operating by electricity would be less than for steam. Mr. Clark suggested that the railways instead of spending millions of dollars to reduce the ruling gradients on the main lines of steam roads would do far better to electrify them. He drew a parallel between the slowness with which the steam roads take advantage of electrification to reduce the capital investment and cost of operation in this way and the fact that a considerable amount of the mileage of the cable operated street railways was built and placed in operation after the advantages and reliability of electrical operation for this purpose had been demonstrated.

In concluding his paper he stated that there were three reasons why the steam roads had not converted more of their mileage from steam to electrical operation. The first of these was that the roads had been severely harassed and hampered by legislation, both federal and state, so that railway managers found it difficult to raise the additional capital which was required by electrification and other betterments. In the second place the electrical engineers have not been able to come to any agreement as to the best system to use and naturally the steam railway officers have been deterred from taking up this matter while the "battle of the systems" was going on. The third reason was because of the past traditions and conservatism prevailing in railway circles, although Mr. Clark later made the statement that American railway men are conceded to be the most progressive in the world.

One of the other speakers suggested that possibly another factor had more to do with this than the three above mentioned, and that was that the railway men have so much to do and the roads are growing so rapidly that they can not take the time to consider electrification, and that any money which is available for betterments is more badly needed for other purposes. G. R. Henderson, of the Baldwin Locomotive Works, suggested that the whole proposition was purely a financial one and that it was impossible to show good financial returns for electrification on many of our railways. On every road where electrification has been adopted up to the present time there has been some special

reason for so doing. The reason why European countries have gone into the matter to a greater extent is because of the greater density of traffic. Uniformity of traffic is just as necessary as density, in order that a good load factor may be obtained, and it is practically impossible to obtain this condition on most of the steam roads in this country. Another speaker suggested that the greater extent of electrification in European countries was undoubtedly due to the scarcity of fuel and the need of conserving it to a very much greater degree than is now necessary in this country.

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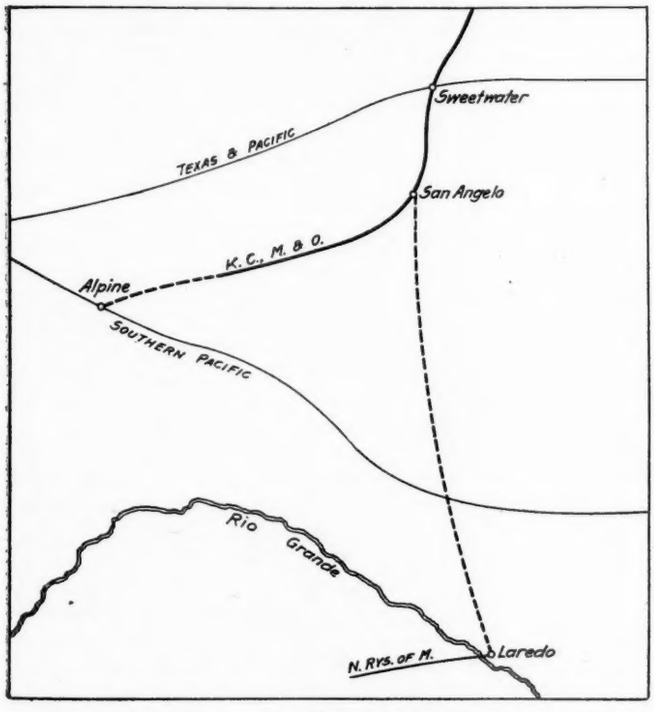
## PROSPECTS FOR THE KANSAS CITY, MEXICO & ORIENT.

DURING the past week receivers have been appointed for the Kansas City, Mexico & Orient. The receivership proceedings were brought in the interests, presumably, of a committee of English bondholders. While the receivership is friendly in the sense that it is undertaken under the auspices of the security holders, it is probably due largely to a feeling that, if the road is to be put on a paying footing, a change in the method of financing it must be undertaken at once. The situation is particularly interesting, because it stands a good chance of having a "happy ending" and throws light on a number of theories and fallacies of those who claim that the part played by underwriting syndicates and bankers in railway financing could well be dispensed with.

About eleven years ago Arthur Stilwell, president of the present railway company, formed a construction company and sold stock at par, or above, to the extent of about $10,000,000, and later formed another construction company, selling $3,000,000 additional stock at par. These construction companies made contracts with the railway company formed under the name of the Kansas City, Mexico & Orient, by which they agreed to build the road for so much per mile in stocks and bonds of the railway company. Parts of these stocks and bonds were to be sold in the interests of the construction companies by the United States & Mexican Trust Company.




**The Southern End of the Kansas City, Mexico & Orient.**

*The dotted lines show building that remains to be done to give K. C. M. & O. traffic connections.*

The original financing of the construction companies was done rather skillfully. Mr. Stilwell was originally an insurance man and, having no banking connections, he undertook to sell the construction companies' stock to private investors. It is believed that there are in the neighborhood of 4,000 stockholders of these two companies. On the terms under which the construction companies undertook to build the line, the stockholders stood to make a rather good profit, while the railway bondholders had the protection of the $13,000,000 equity back of their bonds. At the time at which the contracts were made, materials and labor were very considerably lower than they are at present, and a 4 per cent. bond was selling at a higher price than it is today.

The K. C. M. & O. was projected from Kansas City to Topolobampo, which is a good port near the mouth of the gulf of California. Probably, either because of actual railway opposition or of fear of railway opposition, the line was not started from Kansas City, although it is claimed that the K. C. M. & O. had, and still has, a franchise for a belt line part way around Kansas City. Construction was begun on three separate pieces of road. One was from Topolobampo northeast, of which 73 miles are in operation. The second piece was over the mountains in Mexico, and of this section 283 miles, from Sanchez, Mex., to Falomir, has been completed. The third and most important piece was that which has been built in the United States from Wichita, Kan., southwest to Big Lake, Tex., 583 miles. There is a connection with the Texas & Pacific at Sweetwater, Tex. A branch has also been projected and surveyed from San Angelo to a connection with the National Railways of Mexico. The complete line from the Pacific coast to Kansas City holds out very attractive possibilities in the way of through traffic, and naturally would meet with the opposition of trancontinental railways serving Kansas City.

From the start, the construction company, not having any strong banking affiliations, was unable to build as rapidly as would have been profitable. Railway bonds had to be sold with a bonus of railway company stock. It was probably the original intention to keep the greater part of this stock of the railway company for the construction company stockholders. The necessities of the situation have been such, however, that some of the equity of the construction company stockholders has been eaten into by the need for completing the building of additional railway.

The railway built in the United States has been built on good standards for that part of the country; the money has been well and economically spent, and at times, even in its uncompleted state, the railway has been able to earn its operating expenses and something toward its fixed charges; but last year it was operated at a deficit. The fact that the road has not got into Kansas City has made it very difficult to compete for through traffic, but it has received from its connection with the Texas & Pacific a certain amount of traffic which is shipped into Kansas City from Wichita over the Santa Fe or some other road. A connection with the Southern Pacific at Alpine would much improve the strategic position of the K. C., M. & O., and the projected branch line from San Angelo down to a connection with the National Railways of Mexico would put it in first class position to make a strong bid for a good share of the traffic delivered to the United States lines by the National Railways. The sketch map shows thoroughly the situation of the southern U. S. lines. The dotted line into Alpine is graded. The dotted line to Laredo is only projected.

What the road needs is a line to Kansas City and the completion of its other lines in the United States. If this can be done at a moderate cost for financing, it ought to be by no means impossible to operate the United States part of the project as a railway and operate it profitably; the Mexican line can be connected up later. The trouble has been that the project has dragged on over ten years or more; if it had been financed in the ordinary way through strong banking connections the United States part of it at least would have been built long before this.

Here is an example of a railway, for which there is good traffic reason, which naturally has to meet the opposition of competitors already in the field, and which has been financed through the sale of its securities to private investors, but which could

not be carried to completion. Moreover, in selling its securities the road has had the energies and abilities of a quite extraordinarily skillful man.

The stocks of the railway company and, it is understood, of the construction company, are held in a voting trust which does not expire until 1917. Mr. Stilwell himself did not gain control of the company through any great amount of money which he was able to put into the road, but entirely through his own personality and through his ability to interest private investors. Instead, however, of proving a cheap way of financing the road, this sale directly to investors has proved an expensive way. Of course, no accounts of the construction companies have been made public, even to the directors of the railway. The road is thoroughly well built, and where the construction company originally estimated that it would only have to put in $15,000 a mile it has actually paid in in cash about $18,000 a mile, so that as far as can be told, there has been no promoter's profit at all made out of the road. The bondholders had a large actual cash equity behind their bonds, and yet the company has had to go into the hands of a receiver and will probably have to be completed under a different plan of selling its securities. Since the road has been put in operation, it has had the services of a first class traffic man and has been inspected by reliable engineers and found to be in excellent shape.

## THE NEW YORK CENTRAL'S INTEREST FREE TERMINAL.

WHILE the Pennsylvania Railroad during the past year wrote down on its books the cost of its New York terminal from about $85,000,000 to $57,000,000, the New York Central & Hudson River and the New York, New Haven & Hartford have been making plans to utilize the space above their terminal tracks in such a way as to make the income from this space pay the entire interest charges on the cost of building the terminal yards, and even of the station itself. It is doubtful whether there is any other railway terminal in the United States beside the Grand Central at New York so situated as to permit such a plan as that of the New York Central being carried out successfully. The reason for this is that land values in that part of New York have risen so rapidly since the owners of the land on which the terminal is to be built bought their holdings, and transit facilities have become so concentrated in this part of the city, that there is an almost unlimited demand for office space in this neighborhood.

The New York Central & Hudson River and the New York & Harlem own between them all of the property bounded on the south by Forty-second street, on the north by Fiftieth street, on the west by Madison avenue, and on the east by Lexington avenue. This makes an oblong of 32 "blocks" of about 200 ft. sq. each. This property, owned severally as indicated above, has been leased in *toto* to the New York Central & Hudson River and the New York, New Haven & Hartford, and these two companies are jointly building the new Grand Central terminal.

The new station is being built at Forty-second street to have a frontage half the length of the distance from Madison avenue to Lexington. On either side of this station there is to be built a very large hotel. The hotel on the Madison avenue side is to be built in an expensive style that will be comparable with the finest hotels in Europe or America. All the rooms will have baths, and they will all be outside rooms. The prices will be in accordance with the luxuriousness of the hotel. The hotel on the Lexington avenue side is to be a very large one, but is to be built to meet the needs of the traveling public who wish to get comparatively small rooms and pay correspondingly small prices, from $1.50 to $2. It is to be thoroughly modern.

The idea of the New York Central is to make a terminal yard extending from Fiftieth street down into the new station at Forty-second street, the yard to be the full width of the property between Madison and Lexington. This yard, as well as the train floor of the station, is to be in two decks. Property in this neighborhood is worth between two and three million dollars a "block." From the surface down the entire strip is almost solid rock. This rock is being excavated, and both decks of tracks will be put considerably below the present street level. Over these tracks it is planned to erect a number of commercial office buildings.

The railway use of the ground does not in any way interfere with the use of it above the street level in exactly the same way that any other real estate might be used. As in the case of the experimental building put up for the Furniture Exchange, and now being used by that company, the New York Central and the New Haven will probably advance the greater part of the money needed to build these commercial office buildings, and in exchange will take mortgages which, beside carrying interest, will have a sinking fund provision which will eventually make the building revert to the New York Central and the New Haven. The building company will, in addition to the interest on the money it borrows, pay the Central a rental, and it is the income thus derived that will go to wash the cost of excavation and the construction work, and carry the cost of the land.

For this entire strip of office buildings, including the station and the two hotels, there will be a single power plant at Fiftieth street, furnishing light, heat, power, compressed air, etc., for all properties, so that there will be just two smoke stacks for all these buildings.

At present the New York Central and the New Haven are operating their trains into a temporary station with two levels of tracks at Lexington avenue and Forty-third street. The property from Forty-second street north to Fiftieth is occupied in part by the express buildings at Madison avenue and Forty-fourth street and some buildings on the northeast corner of the strip which are not now being used for railway purposes, and by two office buildings put up over the railway tracks as a beginning of the scheme of improvement.

The special conditions which make such a plan as this feasible, and which hold out a reasonable hope that such a plan will be financially successful, are due largely to the unusual transit facilities which are concentrated at this part of New York City. On both Madison and Lexington avenues there are surface car lines. On Lexington avenue there will be the east side subway, and on the west there is now the Broadway subway extending both into the Bronx and up the west side. At Forty-second street there will be, starting at the top, the Third avenue elevated, the surface lines, the present local and express subway, the new extension from the McAdoo tunnels to New Jersey, and below that the Steinway tunnels to Brooklyn and Long Island. There is no other places in the world where urban traffic is so concentrated as to require five levels. Such a concentration of traffic as this makes the property for office buildings very valuable indeed. While, of course, New York is now divided into zones in which different classes of business apparently tend to segregate, there are a very great number of business men who do not need to travel down to the lower end of Manhattan and to whom it would be of great advantage to have their office uptown. The New York Central and the New Haven serve the entire suburban district northeast of Manhattan from the Hudson river to the sound; the McAdoo tunnels serve the New Jersey suburban district in connection with the roads ending at Jersey City, Hoboken, etc., and the Steinway tunnel will afford a route to all of Queens and a part of Long Island.

Floor rates in nearby good buildings are now about $2 per square foot for outside rooms and $1.50 for inside rooms, but with the opening of the new tunnels and the improvement in New York Central and New Haven facilities, they must be expected to be rather higher by the time the contemplated development is completed.

The plans that we have outlined will take possibly as long as 15 years to become accomplished facts, but within at least that time the present dream should become a reality.

## CAR SHOP APPRENTICES.

THE increasing importance of the car department is seen not only in the enormous car equipment and the heavy expense for repairs and renewals, but in the variety of cars, the rapid progress of the conversion from wood to steel, the great increase in carrying capacity, the improvements which reduce wear and increase the strength, as well as in the construction and equipment of car shops suitable for the radical changes in shop and repair yard practice which have come with the steel car. It is becoming apparent that the organization of the car department has not been fully adjusted to these changes, and that generally speaking, the men who are being trained for responsible positions do not appear to measure up to the mark which the change demands. It seems desirable, therefore, in some way to induce a higher grade of young men to enter the car department, with the idea of making themselves specialists in that line of work.

Railway presidents and managers are deploring the fact that there is not a sufficient supply of good material among the younger men in the car shops from which they can make promotions to responsible positions, but they have not yet worked out any scheme of education and organization to improve this condition. The Master Car Builders' Association has recognized the necessity of some improvement in the character and education of the car shop apprentice. At the close of the 1911 convention a member said, "Very little attention is now paid to the development of young men for the car department. The steel car is different from the wooden car, and the work in connection with it is more complicated. The material for apprentices of proper intelligence and education appears to be scarce, and something should be done to encourage young men of that kind to take up car work. There is trouble in filling the position of car shop foremen, and some action should be taken by the M. C. B. Association toward securing a good grade of apprentices in the car shops."

A motion to appoint a special committee on car shop apprentices was adopted by the convention, but the executive committee has since arranged for an individual paper on the subject by I. S. Downing, master car builder of the Lake Shore & Michigan Southern at Collinwood, Ohio, as a part of the program for the 1912 convention. That paper may elaborate some of the facts here stated and show the necessity of a reform, and we trust it will recommend an improved apprentice course for the car department and a change in the organization of the mechanical department which will place the car apprentice in the same line of promotion as the machinist apprentice.

Compared with the locomotive, cars are regarded by most young men as uninteresting, and their construction and repairs as unimportant. Promotions from the car department to the higher official positions are very rare, and we can easily mention the few conspicuous examples. On the New York Central lines the car men have come to the front more than any other line. E. D. Bronner, master car builder, was made superintendent of motive power of the Michigan Central. LeGrand Parish, master car builder, was made superintendent of motive power of the Lake Shore, and A. M. Waite, a master car builder, was made general superintendent of motive power of the New York Central lines. On the Pennsylvania, E. B. Wall, a graduate of Stevens Institute, entered the Altoona car shop as a special apprentice, and learned the car business so well that he became an important member of the Master Car Builders' Association. He was made a superintendent of motive power, and afterward superintendent of the Chicago terminal of the Pennsylvania Lines. These men were advanced on account of their superior knowledge and executive ability, and not through any direct line of promotion provided for in the organization of the mechanical department of these railways.

The relative importance of the car and locomotive departments may be gaged in some respects by the amount expended for repairs and renewals, and on most lines this cost for cars exceeds that for locomotives, each being usually over 10 per cent. of the total operating expenses. The item of car repairs, in addition to the direct charges for labor and material, includes large appropriations for shops, tools and salaries for supervision; the fund should be sufficient to permit of salaries for foremen and superintendents which will be attractive to educated men of high character and good ability. The car shop in the past was regarded as of minor importance and was poorly equipped with labor-saving devices. It is only within recent years that these shops have been designed with overhead traveling cranes, electrical equipment and improved heating furnaces for metal working tools.

The design of steel passenger and freight cars involves engineering problems which are worthy of the best talent of the technical man, but very few such men are found in the railway car department. The technical schools have courses in car design which should provide a good foundation for specialists in that line of work, but the conditions of railway shop employment are not such as to make it an attractive field for further development in a practical way. As we have pointed out there is a demand for such material, but the prospect of advancement must be more definite, and the salaries more remunerative, to induce a better grade of young men to select car building as their profession.

The motive power men, those whose training has been almost entirely in the locomotive department, now dominate the two great railway mechanical associations, and the master car builder is no longer regarded as eligible to the principal offices of the Master Car Builders' Association. This condition has been brought about by the higher officers of the railways who now find that something must be done to bring the car department up to a higher degree of efficiency.

The development of car design and of most car equipments and details is almost entirely in the hands of outside manufacturers, and it requires rare good judgment and technical knowledge, as well as practical experience, to select that which is best. There is opportunity for the exercise of these qualities in the preparation of specifications for car wheels for heavy equipment. The freight car truck, probably the most important item in freight rolling stock, is built in the greatest diversity of designs—some good, some bad. Why is there not competent authority and ability to decide which is best? The draft gear of freight cars, which causes such a large expenditure for repairs, is sold in a variety of designs which bear trade names instead of railway standards.

The history of the friction buffer is not very creditable to the men of the car department, for they have not persistently followed up the tests of this apparatus in various forms, so that now, when it should be generally applied, there is no authoritative information to show which type is best. The box car door and the car roof show equal diversity; some of them must be better than others, but the decision as to which type is used often rests more on personal relations than on actual mechanical merit. These are some of the reasons why there is a call for reform in the car department, and which show the necessity of training up a body of men who will have the ability to design cars and their details, and to select with good judgment those which are purchased.

The locomotive equipment on many lines is now so large that it could well occupy the entire time of the motive power officers, and there should be officers of equal rank in general charge of the car departments. On some lines this condition exists, the car department superintendent having the old title of master car builder, but there should be a superintendent of motive power and a superintendent of the car department of equal rank. Under such an organization, the car shop apprentice would have before him the opportunity of advancement to car foreman, superintendent of car shops and superintendent of the car department. When the officer in charge of cars becomes recognized as equal in rank and importance to the superintendent in charge of locomotives, the car department will become a more attractive field for young men of ability with the training, both practical and technical, which the modern conditions demand.

## THE RAILWAY LABOR SITUATION. IV.

RAILWAY operating officers complain that they never have any rest from negotiations, controversies, mediations and arbitrations regarding wages and conditions of employment. Whether the business situation, from the railway standpoint, is good or bad, they are constantly being presented by employees with demands for higher wages, shorter hours of work and other changes which, if made, tend to increase operating expenses. Regardless of whether complaints concerning these conditions are justifiable, it is a fact that they do exist. The managements hardly get settlements made with one class of employees until the representatives of another class are knocking at the door. And settlements for one year are hardly made until those for the next year must be taken up. The use of the word "settlement" in this connection is often a misnomer. It implies that something has been settled; and sometimes new arrangements are sought long before the periods for which the old ones were made have expired.

Railway officers also complain that the results when differences with their employees are mediated or arbitrated are apt to be as unsatisfactory as when they are determined by direct negotiations, because the agreements reached by mediation and the findings made by the boards of arbitration are based on no recognized principle and furnish no precedent for future settlements. Nor do such expressions come from railway officers alone. They come also from the leaders and the rank and file of the labor organizations, although in recent years practically every negotiation, mediation or arbitration has resulted in higher wages or easier conditions of employment. Both sides agree that there is room for much improvement in the settlements made and in the methods used in reaching them.

Within recent years wages have steadily increased, whether railway gross and net earnings have been increasing or decreasing. One argument made for increases in wages in many places has been that the compensation of labor should be standardized. In other words, the wages of men doing the same class of work in the same territories, whether on different roads or on the same road, should be the same. The standard to which they should be brought, the labor leaders have contended, is that of the highest wages being paid on any road in any given territory. The principal and most effective argument for higher wages, however, has been that the cost of living has been increasing. Admitting that wages should be standardized, it does not follow that the standard to which all should be made to conform is the highest scale in effect. Admitting, also, the force of the cost of living argument, the railways' cost of living must be considered as well as the employees'. The employees' contention is that they must be paid reasonable wages, and that if this unduly increases the railway's cost of living it should recoup itself by increases in its rates. But here the public's cost of living becomes a factor, and the Interstate Commerce Commission, in its decision a year ago in the Eastern rate advance case, having in mind the addition to the public's cost of living that might result from advances in rates, said: "Before any general advance in rates can be permitted, it must appear with reasonable certainty that the carriers have exerted proper economy in the purchase of their supplies, in the payment of their wages and in the general conduct of their business." It follows that in fixing the wages and conditions of work of railway employees the rights and interests of the employees, of the railways and of the public should all be given due weight. What wages the employees ought to receive, and what rates the railways ought to receive from the public, can be equitably determined only when they are considered as a part of one problem.

The matter has not been handled in this way in the past. When settlements have been reached by means of direct negotiations between the railways and their employees, which side has gained the more has depended on which has been the more skillful negotiator, or has been able to back up its diplomacy with the heavier battalions. The effect of the settlement on the public has seldom been considered. The mediators under the Erdman act have assumed that their only duty is to secure some adjustment which will prevent a strike, whether the adjustment is itself fair to all parties or not. The arbitrations under that law have been compromises which have always been favorable to the employees, have established no principles as precedents for future arbitrations and have given practically no consideration to the rights and interests of the public. In addition, the Erdman act provides for mediation and arbitration only between the railways and employees who are concerned in the operation of trains. It provides no means for mediation or arbitration between the roads and their shop employees, for example, although a lockout or strike of shop employees may seriously interfere with operation and cost employees, railways and public heavily.

In a letter published in the *Railway Age Gazette* of April 7, 1911, page 825, F. A. Delano pointed out the evils and dangers of the present situation and advocated the creation of a federal court of arbitration to which should be submitted controversies between the railways and their employees. He favored an even-numbered court so that every decision would be made by a majority of at least two. The late F. O. Melcher, in a letter to this paper (*Railway Age Gazette*, June 2, 1911, page 1235) commenting on Mr. Delano's proposal said:

> "It is questionable if either side would assent to an arrangement contemplating a permanent court composed always of the same individuals. The permanent court having once decided against a party to a controversy might again be unacceptable to that same party, whereas an arrangement by which the personnel of the court or board of arbitration could be changed would remove this objection."

Mr. Melcher summarized the policy which he thought it might be expedient to adopt as follows:

> "The Erdman act might be amended to require a member of the Interstate Commerce Commission and the commissioner of labor to put themselves in communication with the contending parties and endeavor by mediation and conciliation to bring about an adjustment of the controversy; and, failing therein, to acquaint the President with the situation, hostilities to be suspended until a commission could be appointed to investigate the subject and prepare a report as outlined above. A thorough investigation and public report would in themselves create a public opinion which neither side might care to disregard. It would provide the only compulsory feature which would be practicable to inject into such proceedings under the present conditions."

The need for the adoption of some means which will bring about adjustments of railway labor controversies of all kinds without strikes, and will at the same time cause the settlements to be made on some recognized basis which will foster the interests and safeguard the rights of all concerned, seems very clear. Railway officers say that the railways cannot go on indefinitely increasing wages without increasing rates. The Interstate Commerce Commission, very properly assuming the attitude of a protector of the public, says that railways before they will be allowed to raise rates must show that the wages that they pay are reasonable. The time is likely to come when the railway managers will say to the representatives of the railway brotherhoods that they cannot afford to raise wages any more unless they can raise rates and that they could not justify increases of rates on the ground that the payment of any higher wages would be reasonable. It is not to be expected that the representatives of the employees would accept the view of the managers that the maximum wages that would be reasonable had been attained. Substantially this situation has developed in the past, and the result has been strikes of serious magnitude. Many railway managers predict that before the labor problem on the railways is solved there will be a greater and more costly strike than any which has ever taken place. Well considered legislation to prevent this would be as important as any for the regulation of railways that ever has been passed.

## NEW BOOKS.

*The American Transportation Question.* By Samuel O. Dunn, Editor of the *Railway Age Gazette.* D. Appleton & Co., New York. Cloth. 5 in. x 7½ in., 290 pages. Price, $1.50 net.

This volume deserves a thoughtful reading by everyone interested in the problem of railway regulation. In the first place, it is interesting. Originally given in large part in the form of lectures, it carries throughout the informal atmosphere of the lecture room. Yet notwithstanding this, its presentation of principles is clear and logical, and its reasoning is in large part convincing. Moreover, the close touch with the practical railway situation that the author enjoys by reason of his position as editor of a railway paper gives him abundance of pertinent illustrative material upon which to draw, and an inside view of the relations between shippers and carriers that is denied to the ordinary student of transportation questions.

This is not a historical treatment of the problems in any way, but a discussion of present issues—a cross-section as it were of the railway situation of the twentieth century. The only significant problem omitted is that of government ownership; the book assumes that regulation rather than ownership is to be the policy in the United States and handles all the issues with that assumption as a basis. It is only fair to say that this was deliberate on the part of the author, and does not commit him one way or the other on the far-reaching question of nationalization.

One's own point of view on the many problems discussed may influence one's judgment as to whether the author is "pro-railway." Personally I am unable to discover any prejudice or bias in the book; such positions as are taken seem to be the result of deliberate thinking which has taken into account all the factors. Disagreement is inevitable concerning an unsettled question, and I have indicated below the points upon which I have reached conclusions at variance with those of the author, yet in no way would I wish to imply by this disagreement that Mr. Dunn's attitude is an arbitrary one, or that it has been taken without due consideration.

Fundamental principles of rate-making are the subject of the first two chapters. The author presents an admirable summary of this intricate question, giving full recognition to the cost of service principle, and demonstrating the inconsistency of those railway officials who deny the influence of this principle in the fixing of individual rates, and at the same time rely upon it as a main support in their arguments against rate reductions. At the same time the limits of the application of the principle are clearly shown and the relative parts that this principle and the principle of value of service play in actual rate-making are made plain.

Discrimination in all its phases is discussed in the next two chapters with abundance of apt illustrations derived from recent rate controversies. The perplexities of the long and short haul situation are well depicted, but I am not sure that the author has sustained his case when he asserts that the lower rate for the long haul is "clearly defensible" if a circuitous route is obliged to put such rate into force to meet a rate already in existence made by a more direct line. Defensible from the railway point of view unquestionably, but hardly so from the broad public point of view, if the new and circuitous route simply divides with its competitor traffic formerly carried by the competing road alone and does not create new traffic itself. I raise another question in connection with the "Commodities Clause," which the author incorrectly calls the "Carmack Amendment." He declares it to be one of the inconsistencies of our law that this clause, while forbidding railways to haul commercial products which they own, allows industrial corporations to own railways. In view of the sweeping language of the clause and the attitude of the court toward it, the author's pessimism seems hardly warranted. Inertia in prosecution rather than inconsistency in legislation seems to be the trouble. Mr. Dunn's suggestions for the elimination of discrimination are sound, and have long been advocated by the more thoughtful students of the problem, namely, pooling under government regulation and the endowment of the commission with power to prescribe a minimum rate.

Railway valuation occupies two chapters and is a strong argument against the real practicability of any complete physical valuation of the railways of the country. It can be of no use in determining the reasonableness of any specific rate and of little use in estimating the justice of an entire schedule of rates. Mr. Dunn very properly questions whether it would be wise to limit railways to a "fair return" by appropriating for the public treasury all earnings in excess of such fair return. He might well have gone farther and insisted that such a policy would inevitably drive us into government ownership.

Efficiency is considered both from the standpoint of economy of operation and from that of the public service. The author does not mince matters, but shows clearly the many ways in which economies may be practiced, such as the reduction of the number of competitive passenger trains. Yet he brings out clearly what the apostles of efficiency so persistently refuse to recognize—the fundamental conflict between economical service from the standpoint of the railway and efficient service from the standpoint of the public. It is his opinion, moreover, that as the country becomes more densely populated and the short haul traffic increases, we shall demand faster and more costly service rather than our present slow and economical service. This would certainly be in harmony with our present unfortunate tendency to increase steadily the costs of distribution. I am hardly in agreement with him in his endorsement of the huge expenditures for magnificent terminals unless, as seems will be the case with the Grand Central, such structures can be made productive. To be sure, aesthetics and advertising are difficult to measure in dollars and cents, but the unnecessary waste of money is clearly apparent in some instances. A good analysis of the accident situation is presented and the feelings of the railways are not spared in the discussion of this, the worst feature of American railway operation. The disciplinary difficulties of the labor situation are fairly shown.

The chapters are given to the competition of railways and waterways, and the point is well brought out, which is so often overlooked by waterway advocates that the cost of water transportation is not determined until the capital charges borne by the public have been properly assigned to the traffic handled. It is a sound position that money should not be spent on waterways until the traffic need for such facility is clearly demonstrated, and that more economical methods of regulating railway rates can be found—through administrative commissions—than by the construction of unusable water routes. The argument for the inferiority of water facilities might have been made stronger if the author had discussed physical difficulties with which such a stream as the Mississippi has to contend. I am not as sure as Mr. Dunn seems to be that there is no ground for anticipating any substantial increase in the amount of traffic moving north and south, for I feel that the Panama Canal has possibilities. Neither do I agree that the government should not provide at public expense the great water highways of commerce. They are as truly "public works" as are the harbors for which the author believes expenditures should be made.

The last two chapters relate to government regulation. The author believes that one of the difficulties of the present administrative commission is its confusion of powers, executive, legislative and judicial, and proposes, so far as the Interstate Commerce Commission is concerned, a plan for a separation of its functions. Its power over rates should be carefully guarded, for administrative discretion tends to arbitrariness. "No right of the public should be left unprotected. But no restriction or burden that the protection of the rights of the public does not clearly require should be placed upon the rail-

road." Control over capitalization should be conferred not to prevent high rates, but to prevent looting, and to ensure a proper use of the moneys derived from the public.

Mr. Dunn pays his respects to commissions, state and federal, and after discussing the qualifications of the members of the Interstate Commerce Commission somewhat critically, says: "Owing to these and other causes it must be regretfully said that many persons, including most railway officers, lack full confidence in the commission's expertness and impartiality." This is a carefully guarded statement, so carefully guarded that it might be used in connection with even so impartial a body as the Supreme Court, yet it creates a wrong impression. There is probably no traffic officer of any railway so expert concerning traffic questions throughout the country as are some of the commissioners, and their impartiality in almost all instances is scarcely open to discussion. I should like to substitute for the sentence quoted another statement guarded with equal care, as follows: Most railway executives recognize the commission's expertness and its increasing impartiality. One other sentence seems to me to need modification: "The laws passed by the state legislatures in the spring of 1911 contain provisions regarding not only the number of men that must be employed in train crews, but also regarding the railway experience employees must have had. The purpose of this is to strengthen the labor monopolies of the railway unions and embarrass the railway managements in case of strikes." While this may in some instances have been the outcome, I doubt very much whether this is a fair statement of the purpose. Most of our legislation is crude, but railways must expect this unless they will firmly grip the accident situation and cure it themselves.

F. H. DIXON,
Professor of Economics, Dartmouth College.

*Maximum Production in Machine Shop and Foundry.* By C. E. Knoeppel. 5 in. x 7½ in. Cloth. 365 pages. Illustrated. Published by the *Engineering Magazine*, 140 Nassau street, New York. Price, $2.50.

The title of this book clearly indicates its scope and object, and while, of course, the complete discussion of everything that enters into maximum production could not be incorporated in one volume, the important factors have been very carefully covered. The author has based his whole discussion on personal experience, and, as a consequence, speaks most convincingly. He groups the machine shop and foundry in his discussion, stating that their work is so closely related that the problems can best be studied in this way. It appears that the foundry is given closer attention, largely because it has previously received less and offers greater opportunity for improvement. The work is divided into 16 chapters, starting with cost accounting, its importance and the best methods, and following through organization, systematic processes, deliveries, despatching and shop details. It briefly discusses the principles and the application in each case.

*Proceedings of the Nineteenth Annual Convention of the International Blacksmiths' Association,* held at Toledo, Ohio, August 15-17, 1911. 242 pages. Cloth. Illustrated. Published by the association, A. L. Woodworth, secretary, Lima, Ohio. Price, $1.00.

The work of this association steadily improves in its quality and scope. Reports of the committees, while generally brief, were supplemented by excellent contributions from various members, and by the clearing up of debatable points during the discussion. The volume contains papers and reports on the following subjects: Drop forgings; frogs and crossings; special welding and threading steel; oxy-acetylene welding; tools and formers; properties of iron and steel in connection with their chemical composition; piece work; effect of heat and working on metals; the foreman and his men; flue welding; frame making and repairing; case hardening; spring making and repairs, and high speed steel. The proceedings also contain a list of members and the membership of the various committees which will report at the next convention to be held in Chicago, August 15, 1912.

# Letters to the Editor.

## THE STEEL WHEEL MARKET.

Pittsburgh, Pa., March 11, 1912.

To the Editor of the Railway Age Gazette:

The *Railway Age Gazette* is entitled to credit for printing the remarks contained in the editorial in the issue of March 8 on the subject of steel wheels. The remarks are pertinent and indicate the exact conditions as they exist. It is to be deplored that many purchasing agents, and in fact we might say almost the whole railway world, are more interested in the lowest price than in the quality. It seems impossible for them to realize that the service obtained from any product should be the measure for comparison and that the cheapest first cost is not always the ultimate cheapest cost. It is not realized that price wars tend to demoralize the whole railway supply industry, and that if a war is continued to a finish it results in a monopoly, regardless of how this monopoly may be attained. When the war is over the consumer must then pay the penalty by an exorbitant price in order to make good the losses that have accrued.

Unquestionably the whole railway world would be better supplied if the purchasing powers would learn to object to too low a price as well as to a too exorbitant price. We should all assist in the stopping of this war, as you aptly term it, demanding quality that will give proper and safe service; at the same time paying a price for the material consistent with the quality and which will afford the manufacturers a reasonable profit.

MANUFACTURER.

## USE OF THE "19" TRAIN ORDER.

Nashville, Tenn., March 9, 1912.

To the Editor of the Railway Age Gazette:

Referring to the article on the unrestricted use of the 19 order, to be found in the *Railway Age Gazette,* March 8, I agree with Mr. Finan in many respects; but I should not care to recommend adoption of the plan on this road, the Nashville, Chattanooga & St. Louis, under present conditions. I know it to be a fact that a southern road has been operated successfully for the past quarter of a century under what may be termed the 19 form of order. I also know that many roads require trains to be stopped to sign orders that only help such trains, and should have been given on form 19, as the train thus helped could not move without such train order. One of the greatest risks we have to run in using both forms is that the 19 order is torn off and hung up where the operator can at once see it, while he may have on his desk a 31 order for the same train, which is much more important. In that situation delivery of the 31 is not made because it is forgotten; it may be covered accidentally by a newspaper. An experienced train-rule examiner can easily take care of this risk and provide against it.

This company has used the 19 form in a most liberal manner during the past six years, and has had no accidents that might be charged to the practice. It permits its despatchers to use the 19 form to run one train ahead of another, or for practically any movement when trains are moving in the same direction. The 19 form is used to fix meeting points between all trains when the order can be sent to all trains to meet or be met before they reach the place of meeting, provided, always, that a copy of the same order be sent to the operator, on form 19, at the meeting point. When we desire to restrict a superior train and find it necessary to give first notice at the meeting point, we use the 31 form for such superior train. We also use the 31 form in directing a superior train to meet another train at a blind siding, that is, a station where no operator is on duty.

It would be impracticable to do away with the 31 form, as it must always be used when necessary to send a restricting order to a crew at some blind siding, and their signatures obtained be-

fore the despatcher can safely permit an inferior train to move against such train.

One of the most serious accidents that have occurred on this road in many years would have been prevented had we been in position to place the middle order at the designated place of meeting. There are very few roads that are able to afford open telegraph offices at all passing sidings, and it begins to look as though there would be even fewer operators employed in the future, unless there should be a radical change in the present public sentiment which imposes almost impossible conditions upon railway companies, while at the same time it denies them the right to secure the money to pay their bills by slightly increasing their charges for service.

I have used the 19 form in many ways during the past 35 years, and have yet to hear of a collision that resulted from its use when it was sent to both trains before reaching the meeting point, and also was issued in duplicate to the operator at the meeting point. I recall many collisions where the 31 form was used and the men on the superior train failed to remember.

Of all the reasonable and practicable devices we have at hand, I regard the middle order as the most valuable, and am surprised that so many officers oppose it without having given it a fair trial.

H. W. FORMAN.

## THE INTERSTATE COMMERCE COMMISSION'S ACCIDENT REPORTS.

CHICAGO, March 6, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

An article in the March number of the *Railroad Trainmen*, "Concerning Railroad Accidents," serves to emphasize the manner in which the public opinion is being manufactured, and the extent to which the present policy of the Interstate Commerce Commission in the investigation of accidents is contributing to promote a series of false conclusions.

A few paragraphs from the article in the *Railroad Trainmen* are illuminating:

"Investigations show rather uncomfortably, for the railways, that the causes can be attributed to defects in equipment and roadway, for in running over the reports of the Interstate Commerce Commission it develops that out of every one hundred derailments approximately sixty-four are caused either by equipment failures or roadway defects, twenty-three are assigned to miscellaneous causes, and it is asserted by a careful observer of wrecks that at least 83 per cent. are traceable to defective equipment and roadway.

"We have had a bad winter so far as rail disasters go and it is a satisfaction to know that at last the public is getting hold of the truth concerning the causes of some of them. The Interstate Commerce Commission deserves full credit for its efficient method of conducting investigations, for the plain unvarnished truth will bring safer conditions more quickly than they ever will be brought about by charging every disaster to Providence." . . .

"On the Big Four, on December 27, a limited left the rail while running seventy miles an hour, and tore up the track for a distance. The cause of the wreck can not be definitely ascertained, but we venture to guess that when the Interstate Commerce Commission makes its investigation, and looks in the inside of a rail or two, Mr. Steel Trust will be found somewhere in the trouble. A few days later the Great Northern 'put one over the bank' and the cause was given as a broken rail. Since then the Pennsylvania has wrecked a limited with the usual results, and these named disasters are but a few of the total number. A combination of science, experience and common sense will assist materially to lift the burden of railway murder from the shoulders of Providence. The demand for high speeds, heavy tonnage, and steel trust profits cannot hide behind an 'act of God' explanation when the truth is disclosed by intelligent investigation." . . .

"It will no longer be the practice to account for a serious wreck by dismissing it off-hand with a simple explanation. An 'act of God,' something gave way under the engine, or an employee did not perform his duty as he should, have about served their time as answers to why wrecks occur."

It must of course have been known to the editor of the *Railroad Trainmen*, as it is known to all who are in touch with railway matters in any degree, that if all the investigations of accidents made by the Interstate Commerce Commission were made public, it would be found that upwards of 80 per cent. of both train accidents and locomotive accidents were ascertained to be caused by the grossest carelessness and disregard of rules on the part of employees.

The Interstate Commerce Commission has made public, at this time, only four reports of investigations which it has undertaken. In all of these the responsibility has been located with the railway.

It has not published any report of the numerous other accidents which it has investigated where the responsibility has been squarely placed upon the employees concerned by reason of their disregard of discipline and criminal carelessness. Precisely what policy directs this manner of dealing with so important a subject cannot be definitely stated, but the inference is unavoidable.

Is it too much to expect that a body charged with such duties as is the Interstate Commerce Commission may at some time realize that its responsibility is to give all the facts in its possession, and not merely those which may serve to emphasize its consistent position as the scourge of the railways?

NUT LOCK.

## ECONOMICAL USE OF TIES.

CHICAGO, February 28, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Referring to the article on "Opportunities for Economy on Railways" on page 1273 of the *Railway Age Gazette* of December 22, 1911, I do not believe on any well regulated railway, and certainly not on the Rock Island, that ties are handled in the way mentioned.

The fact that treated first class ties are used in side tracks does not necessarily prove that untreated second class ties are used in important main tracks, on the same railway. Our experience has convinced us that we are not justified in using untreated white oak ties of either class in main or side tracks on some portions of our lines.

On our southern territory it would be possible to secure white oak ties for a portion of our requirements. These ties cost 53 cents on cars for first class ties, and 15 cents to unload and place in track, making the total cost in place 68 cents each. Based on our records, possibly some of them may last a maximum life of seven years and on this basis the cost per tie year would be $0.0971 for first class ties. The available supply of second class ties is limited and usually will not exceed 10 per cent. of the first class ties. The second class ties cost 28 cents each f. o. b. cars, 15 cents to unload and place in track, or a total of 43 cents in place. On the basis of seven years' life, which is the maximum in our southern country, the cost per tie year is $0.0614.

Treated ties in the same territory now cost us 69 cents each; cost of placing, 15 cents; total cost in place, $0.84. Estimating the life of treated ties in main track at 12 years, which is very low, the average cost per tie year will be $0.07, or less than for untreated white oak. Estimating the life of treated ties in side tracks at 15 years, the cost per tie year is $0.056, which is less than for second class white oak ties.

Our program for tie distribution, which covers both treated and untreated ties, enables us to secure the greatest economy, and is based on price and source of supply, climatic conditions which affect the life of untreated ties, density of traffic, condition of rail and ballast. Our available supply of untreated ties, white oak and cypress, is being used on the territory where our experience has proven these woods will give us maximum service. Second class ties, both treated and untreated, are being used to the extent of the supply in side tracks, but as the supply of second class ties is not sufficient to meet our requirements, we are compelled to use some first class ties in sidings. Our program is revised from time to time to meet changed conditions.

Aside from the showing which I have made on our line, that it is much better for us to use treated ties, there is another indirect cost which we have not approximated, that is, the item of surfacing track due to replacing a number of ties which would not have been necessary if the ties had lasted longer. This adds

to the expense, and also leaves the roadbed unsettled in many cases.

We have given a very long life for untreated ties. In fact on the line between Dallas and Fort Worth, and from Alexandria, La., to Eunice, the maximum life of untreated ties is only five years. If we were to take this life of ties it would make a much better showing in favor of treated ties.

In addition to that, on our Louisiana division we found that pecky cypress is a splendid tie, and it is economical to use it as compared with creosoted ties, although Louisiana is one of the worst states we have for decay.

While it is true that no particular railway was mentioned, I am inclined to believe that other railways are just as efficient as the Rock Island is in this matter.

J. B. BERRY,
Chief Engineer, Rock Island Lines.

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Chicago, March 1, 1912.

To the Editor of the Railway Age Gazette:

In replying to Mr. Berry's letter of February 28 relating to that portion of the article on "ties" in the series of articles on "Opportunities for Economy on Railways" which appeared on page 1273 of the *Railway Age Gazette* of December 22, 1911, my opinion coincides exactly with Mr. Berry's as to the economy in using treated ties for either main or side tracks in the cases named. The case which I cited, however, was not in a territory where second class untreated white oak, chestnut or other similar hardwood ties could be secured at less than half the cost of treated ties. On this railway untreated ties were being used in main tracks. I simply called attention to the waste in using first class treated ties in side tracks, and perhaps in the same locality using untreated ties in the main tracks.

Several instances of this have come under my observation in the last year, and I called attention to them because through the lack of supervision or of proper instructions practices were resorted to which were wasteful in the extreme. There is no argument against the use of treated ties under the conditions named in Mr. Berry's letter, but it is certainly unwise to use first class treated ties in side tracks where untreated ties cost less than half as much as treated ties, and furthermore when untreated ties are being used in the main track on the same railway and in practically the same vicinity.

L. C. FRITCH,
Chief Engineer, Chicago Great Western.

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## WHEEL LOADS AND TRANSVERSE RAIL FISSURES.

New York City, March 1, 1912.

To the Editor of the Railway Age Gazette:

The report of the Interstate Commerce Commission on the Lehigh Valley rail, which was published in your issue of February 16, was an indictment, not of the mills for producing an inferior grade of steel, but of the railways for overloading their rails to a point of destruction. Mr. Howard offered an explanation of the failure which is, at least, a reasonable one, though it may not be accepted by everyone. He describes, and tries to bring out in the reproductions of photographs, the peculiar appearance of the fractures or cracks which seemingly existed in the body of the head of the rail, and which lie at right angles to its length. But no description or photograph can convey a clear idea of the aspect of these fractures to one who had never seen them. They resemble, though they would never be mistaken for it, the smooth surfaces of a progressive fracture, which is so common in the case of axles and other forms subjected to a bending stress. Yet there is a peculiar striation and luster about them that is unmistakable. The phenomena are not new. Many samples of rails have been found in which these peculiar surfaces of broken parts are found, and yet the most careful selection of specimens for chemical analysis by scraping the surfaces has failed to show that segregation exists at such points or that there is anything peculiar about the structure of the metal.

Mr. Howard's explanation is a purely physical one. The hypothesis is that the pressure and movement of heavy wheel loads on the rails cause a cold rolling to take place on the head of the rail, which tends to expand the metal and, if the rail were free to move, would cause it to assume a curved form with the head on the convex surface. As the rail cannot bend, this cold rolled metal is subjected to a compression stress and sets up a corresponding tensile stress in the adjacent metal, which is below the zone of cold rolling effect. This stress increases under the continued rolling, until, at last, it exceeds the strength of the material and a fracture occurs in the body of the head where it cannot be seen.

This cold rolling is identical in its effect to the straightening of a piece of steel by pening. The most common example is to be found in the hammering of circular saws to straighten them. In the process of manufacture, these saws, especially the larger sizes, are left with a complicated mass of internal stresses, which are so balanced that the saw is flat and straight. But when it is heated in its work, or has a portion of its outer edge cut away by gumming, a lack of balance is brought about and the saw will warp. It is put back by hammering the concave surfaces, thus expanding the metal, converting a tensile to a compression stress and warping the plate back into shape. Identically the same thing occurred with this rail. When the top of the head was sliced off from one of the pieces, it immediately assumed a curved form with the expanded or cold rolled surface on the convex side, showing it to have been under compression. Whatever that compression stress may have been, it was balanced by a corresponding tension stress in the adjacent metal. The same tendency exists in wheels, and where brakeshoe wear has been insufficient to compensate for the cold rolling similar cracks have appeared.

Mr. Howard calls attention to the significant fact that these peculiar fractures are found only on the gage side of the rail where the wheel pressures are the greatest; a condition that could hardly be a never-varying coincidence.

It has been shown by experiments made independently by P. H. Dudley and George L. Fowler that the present wheel loads of the ordinary freight car are quite sufficient to put a permanent depression on the head of the rail; experiments that have been corroborated by work done in the laboratory of Wm. Sellers & Co. Further, in an analysis of the stresses imposed by a car wheel on the head of the rail, Mr. Fowler estimated that the pressure existing at the center of the area of contact between the wheel and the rail, where the wheel load was 20,000 lbs., might rise as high as 170,000 lbs. per square inch. These figures have not been questioned; and it is certain that the average pressure over the whole area of contact is more than 100,000 lbs. per square inch, which is well above the elastic limit of the material of any rail.

Again, in the meager investigations that have been made, it has been shown that lateral wheel pressures are very high. Actual measurements have shown that some classes of locomotives may put a load of 56,000 lbs. on the side of the head, and that the thrust of an ordinary freight car wheel may rise to 16,000 lbs. at moderate speeds and to possibly as much as 30,000 lbs. These pressures must produce a pening or cold rolling effect, and, if this is produced, what is to become of the stresses so induced if they do not set up internal stresses in the metal? And if these peculiar markings, which seem to be caused by such stresses, are not so caused, what explanation can be given for their non-appearance in new rails which have not seen service in the track?

Still, the case cannot be said to be proven, even by the facts and analogies here set forth, or by Mr. Howard in his report. And what has been said has been presented merely to show the reasonableness of the hypothesis. It remains, then, to make such an investigation as will demonstrate the soundness or the untenableness of Mr. Howard's reasoning. And to do this would be a comparatively simple task.

MECHANICAL ENGINEER.

## INDUSTRIAL RAILWAYS.

ST. LOUIS, MO., March 8, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I have read with considerable interest articles published by your most excellent magazine in its issues of February 16, page 269, and February 23, pages 325 and 340, and find that in the main I can subscribe to many of the conclusions arrived at by the eminent gentlemen contributing. [The articles mentioned were entitled "Raw!", "The Industrial Railway Situation," and "President Milton M. Smith on Industrial Railways and Unfair Discrimination."]

The "industrial railways," as treated by the Hepburn act and other acts supplementary and amendatory thereto, represents facilities furnished by the shipper to a common carrier. The law plainly states that the allowance made by the common carrier for the use of such facilities, must be reasonable and not sufficiently remunerative to be considered a rebate.

As on a previous occasion, I take exceptions to "statements of facts" that are based on supposition and erroneous information. Your items referred to in this communication, and publications in the past, seem to be for the purpose of criticizing the Manufacturers' Railway and to eliminate, if possible, its function as a common carrier.

Let us assume as a fact that the Manufacturers' Railway has never at any time since 1882 been owned wholly or in part by the Anheuser-Busch Brewing Association. The stock book of the company shows this to be true. The original stockholders were Adolphus Busch, George F. Meyer, William D. Orthwein, et al; and the ownership of the issued stock today is the same as of record in Case No. 3151, partially decided by the Interstate Commerce Commission. On page 304 of this decision the commission states, "The Manufacturers' Railway Company is a common carrier at common law, and therefore within the provisions of Section 1 of the act to regulate commerce, the payment to it of a reasonable portion of the St. Louis rates for the terminal switching services rendered by it, is not unlawful."

Prior to and following the publication of this decision, all St. Louis lines issued tariffs fixing a per car rate on such business as the tariffs covered.

Tariffs issued by lines prior to the publication of the decision, were suspended by the Interstate Commerce Commission, and simultaneous with the publicity of the decision vacation orders were issued, allowing the tariffs to become effective.

Now, in all fairness, withdraw the assumption and admit that these statements I have made are true, or disapprove them from the record, if it be possible.

You regard Milton H. Smith's attitude and his testimony as being eminently fair, honest and helpful to the commission, and by inference I take it that you desire all other railway executives to go and do likewise. Mr. Smith is a man of ripened experience. He has been a power in Southern railway circles for many years, and I venture could tell many things of great interest if he cared to do so.

I also find, from consulting the records of the Interstate Commerce Commission, that in the past it has found it necessary to apply corrective measures to the Louisville & Nashville. If this property's hands are now clean it is the result of frequent scrubbings. We are all entitled to our opinions whether they are right or wrong, and gain wisdom only through experience. My opinion of Mr. Smith's carefully prepared statistical statement is that he has produced but little excepting his personal opinions, and his efforts to read into the criminal class all who have followed the published opinion of the Interstate Commerce Commission, is not only undignified, but will eventually re-act against those so vitally interested in the larger terminals of St. Louis. "Dutch courage" is sometimes essential, but it rarely over-rides law and evidence.

On page 269 (*Railway Age, Gazette*, February 16, 1912), an article appears, written by someone who no doubt desires to hide his identity under a signature of "Railway Man." I have no desire to smoke out this railway man, because his statement indicate that he is "a railways' man." He considers it "raw" that I testified under oath that, as president of the Manufacturers' Railway, I would in all cases endeavor to route business by way of the lines with which our road had traffic relations, rather than, in a spirit of amazing generosity, give the traffic to roads that would allow the Manufacturers' Railway no revenue from the through rates. May I not say to this charge something similar to what is attributed to Patrick Henry in his speech made near Richmond, Va.? I will add something which will seem even rawer to my crictics. It it were possible for me, as an executive of the Manufacturers' Railway, to control the routing on every car of freight received and forwarded by it, I would give every ounce of traffic to railways allowing the line I represent a legal division of the rate, in preference to sending this business by way of routes that did not provide a division of the through rate, and thereby forcing our company to penalize the shipper by adding to the St. Louis rate a charge for the terminal services of the Manufacturers' Railway.

There is one essential distinction between the Manufacturers' Railway and the other common carriers doing business in St. Louis. I believe we are the only common carrier leasing from a shipper facilities which we daily use for the preparation of outbound business and the delivery of freight received. This is one of two points held in reserve for a future decision by the Interstate Commerce Commission. The Manufacturers' Railway has a lease from the Anheuser-Busch Brewing Association, controlling 6½ miles of team tracks and drive-ways, making these tracks accessible for common carrier purposes, and under the lease there is a stipulated rental charge of $24,000 per year which the railway pays to the Anheuser-Busch Brewing Association. For the last eight months of the calendar year ended December 31, 1911, the Manufacturers' Railway handled on these leased tracks 45,106 carloads. Approximately 7,100 of these cars were handled for patrons of the railway who had no relations whatever with the Anheuser-Busch Brewing Association; in fact, a substantial part of this outside business was furnished by other brewing concerns conducting active competition against the Anheuser-Busch Brewing Association.

I tender this communication because many of the railways in the United States are not in accord with the policies outlined in your items referred to herein. As Americans, we know that an impartial tribunal will decide on the law and evidence as to the merits of these contentions, and justice is not dependent upon the insatiable desire to consume and destroy which seems to be vested in certain financial centers. The great steam railways have, in the years gone by, evinced their capabilities of taking care of themselves, and will always find champions to come forward in their defense. Regardless of the great interest in financing transportation, there is a well-defined feeling among the common people that private capital may also undertake to construct and operate railways. A study of the franchises granted to the Manufacturers' Railway by the legislative bodies of the City of St. Louis, would indicate that the people of this city are not only willing, but anxious, to have the Manufacturers' Railway fulfill its destiny and to furnish, as it is now doing, additional transportation facilities for that part of the City of St. Louis now served by it.

G. F. MOORE,
President and General Manager, Manufacturers' Railway.

[With regard to Mr. Moore's contention that the Anheuser-Busch Brewing Association does not control the Manufacturers' Railway, the facts, as shown by the record, are that 95 per cent. of its securities are owned by Adolphus Busch and his son A. A. Busch, and that 5 per cent. of them are owned by the Schuttler Estate of Chicago. These same interests own 75 per cent. of the stock of the Anheuser-Busch Brewing Association. —EDITOR.]

## MR. ACWORTH ON RAILWAYS AND INTERNAL WATERWAYS.

London, Eng., February 12, 1912.

To the Editor of the Railway Age Gazette:

I have read with very great interest Mr. Brown's paper in your issue of January 12, on "Why Steamboat Traffic Declined Before the Railway."

Mr. Brown's history of the Mississippi valley trade seems to bear on its face the evidence of its truth. Granting, however, that the railways beat the steamboats, neither by speed nor by economy, but by organization and certainty, I should like to ask whether this is not after all the essence of the question. And whether the railway will not always beat the steamer for these reasons. The steamboat must always be hampered by the difficulty of through connections. It can only go to certain places, while the railway can go everywhere. Further, it cannot earn a dividend as a railway does by balancing against its small profit or no profit on some parts of its system its much larger profits on other parts; for it is open at all times to competition for the really profitable traffic by anyone who can get together a few thousand dollars to buy a boat. And, again, once a railway is built, the public can rely on its being permanently operated. It is pretty sure to pay something more than working expenses. And any earning on capital is better than none. Steamers with no capital invested in fixed plant will always be taken off less profitable routes and transferred to more profitable ones. Further, the steamboat business is so liable to cut-throat competition at any moment that it is a dangerous investment for small men; while on the other hand, it needs so much local and detailed attention that it is hardly fit for great capitalist companies. Of course, in all this I am referring only to internal waterways.

May I tell a story which has some bearing on this matter, and which will, I think, interest your readers? It was told to me in the year '99 by C. P. Huntington. To what year, however, it related I cannot tell. The Southern Pacific built two fine steamers to run between San Francisco and Sacramento, Cal. They gave a daily service, each boat running up one day, and down the next, and the passenger fare was $2. A private individual thought he saw his way to compete with advantage, and bought a smaller boat, which only gave a service every other day, but, on the other hand, only charged $1 for this service.

The Southern Pacific began to lose money, and when Mr. Huntington next came to California the position was put before him. "Would you like to leave me to run this fight?" said he to the local manager. "Certainly, sir," was the reply. "Is there an old boat you can buy that could give a service?" Being told that there was, Mr. Huntington bought it, ordered the two first-class boats to be laid up, and announced that the new purchase would run alongside the rival boat at a fare of 50 cents. "Why, sir," said the local manager, "50 cents won't pay for the coal." "No, I do not suppose it will," was the answer, "but when you go to war you have got to fight!"

Before long the owner of the rival boat came to Mr. Huntington and asked him what he was prepared to do about it. Mr. Huntington replied that he would buy his boat for $10,000—I think the sum was. "But, Mr. Huntington, the boat cost me $20,000, and she is worth it." "Very likely, but I am only going to give you $10,000." So the fight went on for a while longer. When the spring came Mr. Huntington was on the point of returning to New York. He sent word to his rival that he was leaving California the following week, and that if the matter was not settled before he left, his 50-cent boat would continue to run till his return the following winter. Whereupon his competitor at once threw up the sponge and then sold his boat for $10,000. "Since then," concluded Mr. Huntington, "there has been no competition with the Southern Pacific on the Sacramento river."

W. M. ACWORTH.

## A PLEA FOR TRAVELING INSPECTORS FOR THE MASTER CAR BUILDERS' ASSOCIATION.

Chicago, February 27, 1912.

To the Editor of the Railway Age Gazette:

From time to time the suggestion has been made that mechanical inspectors, representing the Master Car Builders' Association, be employed to travel throughout the United States, to aid in bringing about uniform understanding and proper observance of the M. C. B. rules relating to car interchange and car repairs. That room exists for an improvement in the application of the rules of interchange there is little question, and it is believed that traveling inspectors would be extremely helpful in stopping the unnecessary rejections of cars which now take place in interchange, as the result of a misconception of what the rules require.

The American Association of Railroad Superintendents and the Association of Transportation and Car Accounting Officers have joined in recommending concerted action throughout the entire country to minimize the setting back of cars in interchange. Their recommendation that a standard form be adopted whereby the rejecting road shall issue a detailed report at the time of rejection, showing the responsible officer of the delivering road exactly why the car was rejected, will without doubt materially improve the service, if put into effect. This recommendation of the two associations, good in itself, might well be carried still further, so that the M. C. B. Association, through its traveling inspectors, could be kept in touch with what is going on in this respect throughout the whole country, comparing the practices in vogue at the more important places, so as speedily to correct whatever difficulty there may be. That such traveling inspectors would also aid in bringing about an improvement in the rendering of car repair bills there is little doubt, and the need of an improvement in this respect is recognized, although unfortunately not as fully appreciated as it ought to be. Another thing the traveling inspectors could do for the railways would be to help to bring about an observance of the M. C. B. loading rules, particularly with respect to lading on open cars.

These loading rules are, of course, primarily for the guidance of the shippers and of the initial carrier, and while they are supposed to be binding so far as the roads are concerned, they certainly have not been, up to this time at least, binding upon the shippers, and as a matter of fact the railways can and do deviate from them at will. Wrecks in the past have been caused by the improper loading of open cars, and if a serious wreck should again be caused on this account, it has been intimated more than once that the Interstate Commerce Commission will extend its inspection to cover the loading of cars.

Still another useful purpose to which such a traveling force could be put would be that of examining into the methods used in preparing per diem interchange reports, and helping the railways as a whole to bring about reforms in this regard. The expense of maintaining a force of, say, six competent mechanical men would be slight, taking the railways as a whole, and there seems little doubt that the imperfections now discovered by the safety appliance inspectors of the Interstate Commerce Commission would be lessened under a system of general supervision such as that contemplated.

The Master Car Builders' Association is of the greatest importance, as all will agree. Let its executive officers be given that help which is absolutely essential in carrying on important work. With a competent staff, supplemented by the gratuitous service which the members will continue to give, important and far-reaching results are bound to follow.

MASTER CAR BUILDER.

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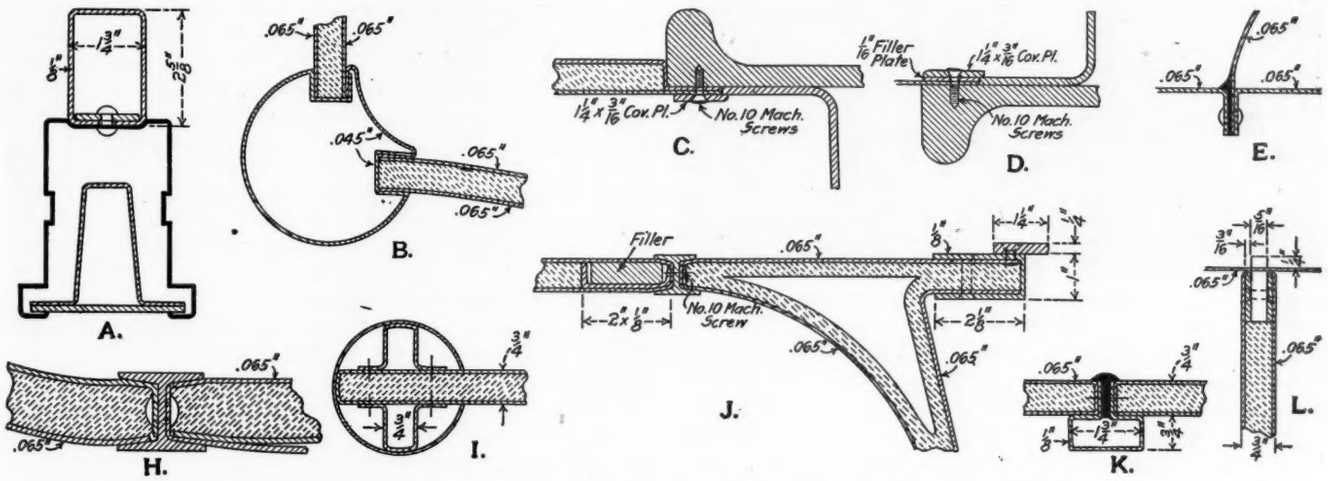
The Bolivian railways from Oruro to Cochabamba and from Rio Mulatos, on the La Paz-Antofagasta line, to Potosi, now in course of construction, will be completed and in operation within six months.

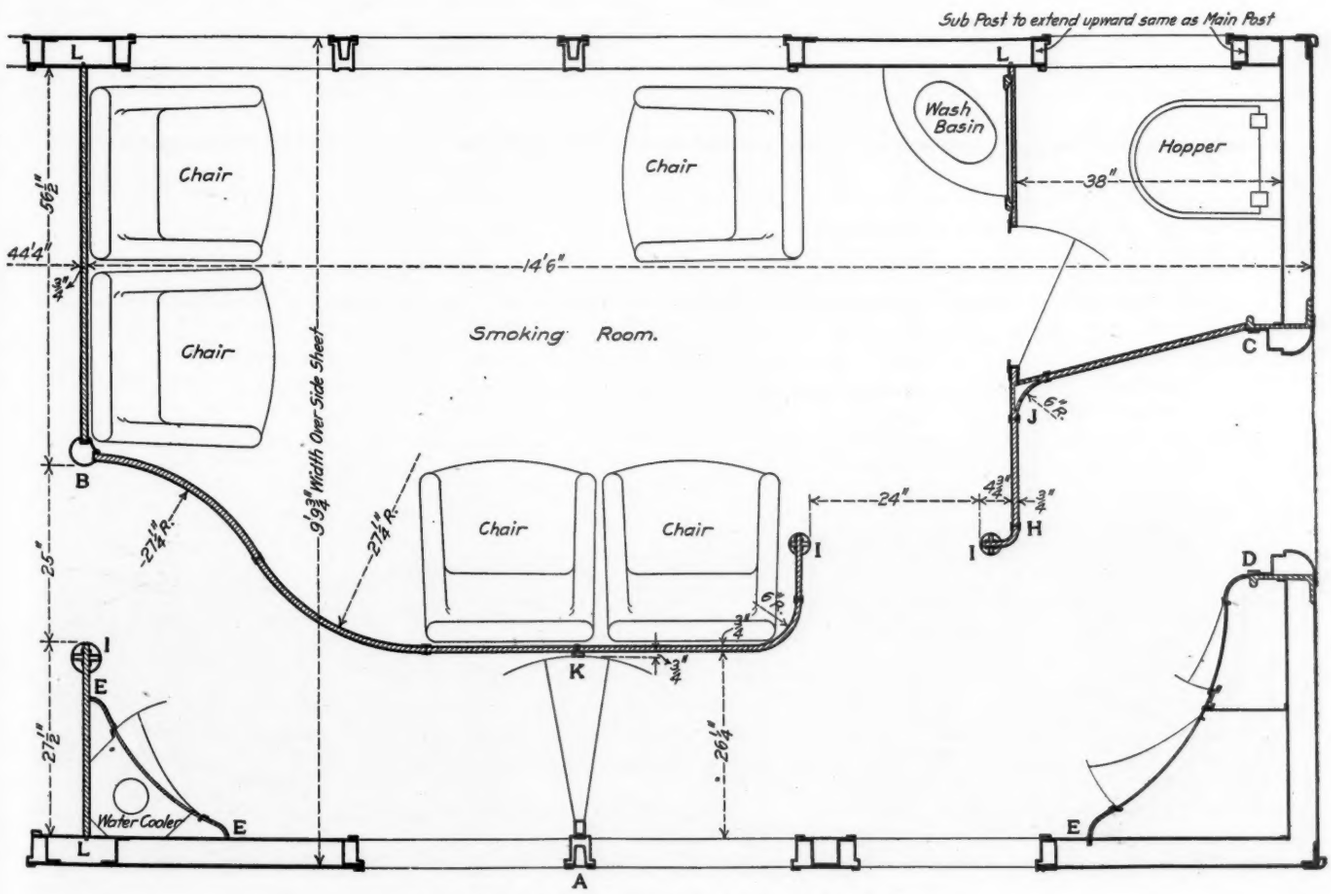
## STEEL PARLOR CARS FOR THE LONG ISLAND.

Attractive parlor car equipment is an important part of the rolling stock on a railway where there is a large amount of passenger traffic on comparatively short hauls. Recently in ordering new cars of this type the Long Island used the framing of the standard Pennsylvania P-70 all-steel coach as the basis of what has proved to be commodious and attractive parlor cars. Ten of these have been built by the American Car & Foundry Company, New York. The structural part of these cars was fully described and illustrated in the *Railroad Gazette* of June 14, 1907. They are 70 ft. 5¾ in. long over the body corner posts, and have been arranged for 26 chairs, a drawing room with a sofa and two movable chairs, a smoking room with five wicker chairs, or a total of 36 seats in addition to two toilets and the necessary lockers, etc.

Extreme simplicity has been the keynote of the design in the interior, and the flatness of the surfaces has been relieved with small moldings only. Commodious racks of a square box design in keeping with the rest of the car have been provided in place of hooks. The only sign of ornamentation in the interior is found in the door posts and caps at either end and this, as may be seen in the illustration, is severely simple in its treatment. The interior is finished in steel grey tone, being relieved with narrow gold stripping and a fine red line in the panels. The lower deck is of slightly darker shade than the sides. Special care has been given in the interior to get smooth surfaces and rounded corners at the junction of all of the




Details of Steel Interior Finish in Smoking Room End of Steel Parlor Car.




Plan of Smoking Room End of Steel Parlor Car.

**Interior View of Parlor Car Showing Simplicity of Finish.**

steel plates. The way in which this has been done is clearly shown in the detailed illustrations at the various junctions. The chairs have mahogany frames and rattan seats and backs which with the green Wilton carpent on the floor, and the light interior finish makes the car especially attractive for summer traffic.

Electric lighting is furnished by an axle-lighting system, and several electric fans are provided. The cars are also equipped with steam heat, arrangement being made so that the system is divided into four parts, any combination of which can be put into use as required. Four-wheel trucks of the standard Pennsylvania type for this class of car have been used, with the exception that they have an 8 ft. 6 in. wheel base and 5½ in x 10 in. journals, in place of a 7 ft. 1¼ in. wheel base, and 5 in. x 9 in. journals. The cars have a total weight of 124,000 lbs.

## THE EMPLOYEES' COMPENSATION BILL.

The bill to provide compensation for accidental injuries to railway employees engaged in interstate commerce, which was recommended to Congress by President Taft February 20, and which was discussed in our issue of December 15 last, is H. R. No. 20,487, and it was introduced in the house by Representative Brantley, of Georgia, a member of the commission which drafted it. The title is "A bill to provide an exclusive remedy for compensation for accidental injuries, resulting in disability or death, to employees of common carriers by railroad engaged in interstate or foreign commerce, or in the District of Columbia, and for other purposes."

Section 1 requires every common carrier, etc., to pay compensation to any employee who "while employed by such employer in such commerce" sustains injury, etc., or to his dependents.

Section 2 imposes the same obligation in the District of Columbia as regards all traffic.

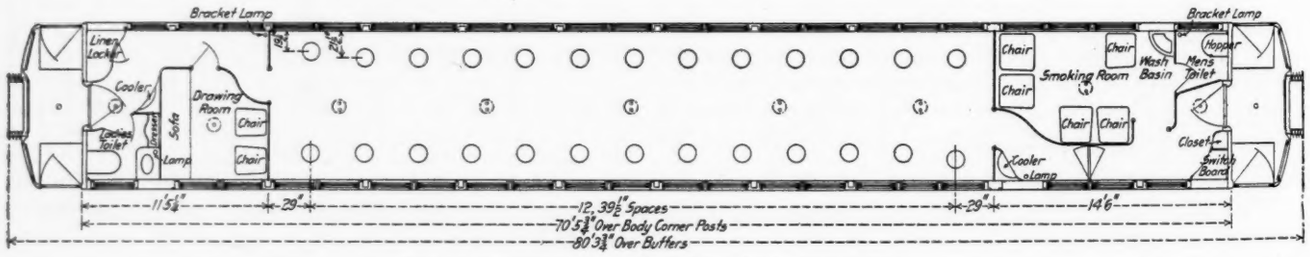
Section 3 exempts the employer from civil liability for personal injuries.

Section 4. Liability for payment begins 14 days after an injury, but the employer must furnish suitable medical and surgical aid and assistance during the 14 days.

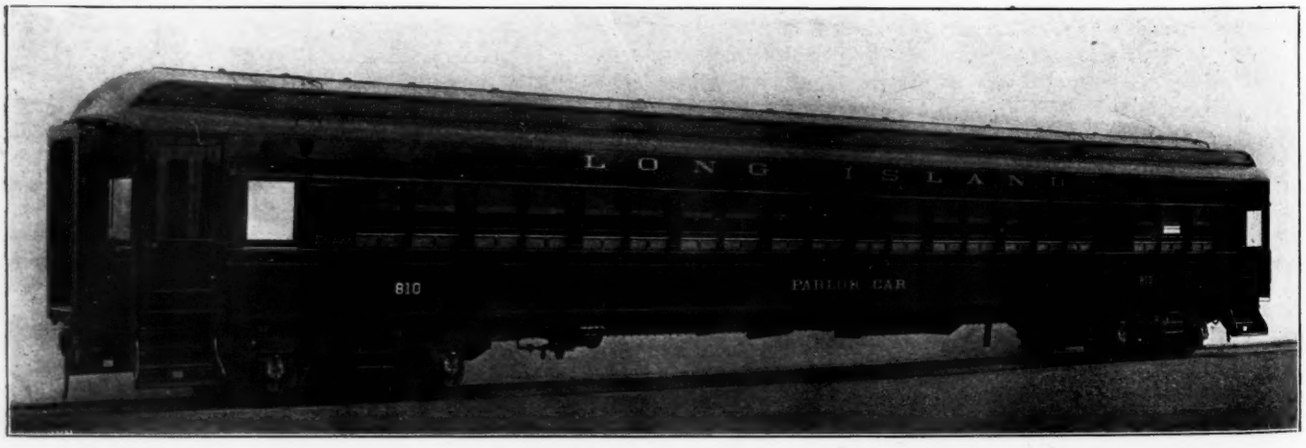
Section 5. After the 14 days, the liability for medical aid, etc., is limited to $200. The employee may furnish his own physician or surgeon. The compensation named in the schedules is in addition to medical aid, etc.

Section 6. Compensation is not to be allowed if an injury is occasioned by the willful intention of the injured person to injure himself or another, nor if an injury is due to intoxication on duty.

Section 7. Requires written notice of injuries to be given within 30 days; but with good excuse this period may be length-




**General Arrangement of 70-Ft. Steel Parlor Car.**




**Seventy-Foot Steel Parlor Car; Long Island.**

ened to 90 days. But if an employee dies within 24 hours, no notice is required; nor when an employee, absent from his work two days, dies within 30 days and the employer knows that he has been injured. Provision is made for serving the notice in various ways, even by registered letter.

Section 8. At any time after 14 days an employer and employee may settle by written agreement, as may also his dependents in case of death, but the amounts and periods of payment agreed upon shall not vary from those prescribed in the law.

Section 9. An employer and his employees may organize committees to settle disputes and award compensations. Where such a committee exists, differences shall, upon request in writing of one party and the written consent of the other, be settled by such committee. The award made by such committee shall be final, except that it may be modified by a subsequent agreement; and except also that, within two years, an agreement may be reviewed and revised by the government adjuster on the ground that the incapacity of the injured employee has ended, increased or diminished.

Section 10. At any time within two years an injured employee, having made an agreement, must submit himself at reasonable times for examination by the employer's physician, having also his own physician present if he so desire. The employer shall have the right in any case of death to require an autopsy at his expense.

Section 11. Authorizes the revision of agreements by the adjuster, as before mentioned.

Section 12. The employer must file all agreements with the adjuster within 60 days, otherwise the agreement is voidable by employee or dependent. Filing by the employee or dependent also makes the agreement valid.

Section 13. (1) The United States District Court is to appoint a competent person as adjuster of accident compensation, with additional adjusters where necessary; salaries from $1,800 to $3,000. The attorney-general is to decide territorial limits and prescribe salaries according to amount of business to be done. Every appointment is to be reported to the Circuit Court of Appeals which, within 30 days, may disapprove the appointment. (2) The adjuster shall be a resident of the district for which he is appointed; must hold no other office, and must not be a relative of any federal judge in his district, and shall hold office for four years. He may be removed by the court if his services are no longer required, or for other good cause, subject to reinstatement by the Circuit Court of Appeals. An adjuster is not forbidden to act in a like capacity under the law of any state. (3) The adjuster is empowered to enforce order in his presence while transacting business, to subpoena witnesses, and to formulate his processes, etc., consistent with law. (4) Misconduct, disobedience or contempt may be referred to the district court which, if the evidence warrants, shall punish the offense the same as for contempt; but no person shall be required to attend before an adjuster more than 100 miles from his residence or outside the state of his residence. (5) The adjuster shall have an office, to be kept open during reasonable hours, but may hold hearings at other places. His traveling expenses will be paid, but the sum for subsistence must not be over $5 a day. (6) An adjuster shall not act in a case in which he is interested. If it appear that he is biased or prejudiced, the court may transfer the case to another adjuster, or, if this be not convenient, may appoint a temporary adjuster. (7) Neither an adjuster, nor the partner of an adjuster, shall appear as an attorney. (8) The adjuster may have medical examinations made by disinterested physicians, the fee to be not over $10 for each examination. The adjuster must receive the testimony of any physician called by either the employer or the employee. (9) Witness fees and mileage are to be the same as in the district court and the adjuster may tax costs in his sound discretion; but in any case an employer may offer to allow findings to be made in favor of the employee; but unless the adjuster decides that the sum thus offered by the company is too small, no costs thereafter incurred on behalf of the employee shall be taxed against the employer. (10) The adjuster in the District of Columbia is to be appointed by the Supreme Court of the district.

Section 14. (1) No agreement having been made and no committee having been called upon to act, any case may be brought before an adjuster within six months from the date of the injury. (2) Within ten days after the petition is served the defendant may answer, and as soon as practicable the adjuster shall proceed to hear the case. The decision, both on questions of fact and of law, is reviewable in the district court. If a claim is not presented within six months it shall be forever barred unless the delay was due to circumstances clearly beyond the control of the employee or dependent; but no claim can be maintained after one year, except as provided in this law; under certain conditions, however, claims may be made within three months from the date of the last of a series of payments. (3) The adjuster shall allow either party to be represented by counsel, who need not be a member of the bar, and shall promptly render his findings in writing. Within 20 days, either party may file exceptions and appeal to the district court, where all questions of law and fact may be opened for consideration de novo. The fee on appeal is to be $5 plus a jury fee, where a jury is required. Such fees are to be taxed against the losing party. (4) Either party on written demand may have trial by jury, the jury fee being $5. If not demanded within five days, a jury shall be deemed to be waived. The findings of the adjuster shall be received by the court as prima facie evidence. (5) If a counsel is employed at a stipulated fee, the agreement for such a fee must be filed with the adjuster or the clerk of the court, and in every case it shall be the duty of the adjuster or the court, regardless of any agreement, to fix a reasonable compensation. (6) Appeals may be taken to the circuit courts of appeals and to the Supreme Court. (7) Subpoenas, etc., may be served by a court officer or by any citizen over 21 years old who is a resident of the district; or by registered mail.

Section 15. For persons under eighteen years, or those mentally incompetent, a guardian may act.

Section 16. Payments under this act shall not be assigned and shall be exempt from levy or sale for private debt. In case of insolvency of the employer liabilities under this act shall constitute a first lien on all the property of the employer liable therefor, paramount to all other claims or liens except for wages and taxes.

Section 17. Nothing in the act shall interfere with the enforcement of acts regulating appliances or the conduct of any common carrier. Nothing in this act shall affect the power of the courts to reform or cancel any agreement or any award or findings.

Section 18. Where a person injured has a legal claim against an interstate carrier other than his employer, the employer shall be subrogated to the right to recover from such other carrier. Where an injured person has a claim against any person other than his employer, such person not being subject to this act, proceedings may be taken against such other person; but if anything be recovered the employer shall be entitled to deduct an equal amount from what he pays. The injured employee may assign his rights to his employer; but such employer shall pay over to the injured person all sums collected in excess of the amount due under this act, deducting reasonable expenses.

Section 19. No contract, rule, regulation or device shall relieve the employer from his liability under this act.

Section 20. A month's wages shall be estimated as equal to 26 times the established day's pay prevailing in the service for which the employee was receiving pay at the time of the accident; but no employee's wages shall be considered to be more than $100 a month, nor less than $50 a month; provided that if an employee receives less than $25 a month, the payment for the first 24 months of disability shall not exceed the full amount of such monthly wages. Compensation is to be paid monthly, a percentage of the employee's wages.

Section 21. *Schedule.* (A) Where death results from an in-

jury the following amounts (with certain exceptions) shall be paid for eight years: (1) To a widow with no child under 16 and no dependent child, 40 per cent. of the wages of the deceased. (2) To a widow and a child or children under 16, or a dependent child over 16, 50 per cent.; to be paid to the widow for the benefit of herself and such child or children. (3) To a child under 16, or a dependent child over 16, where there is no widow, there shall be paid, if one such child, 25 per cent.; if more than one, then 10 per cent. for each of such children, but not over 50 per cent. altogether, the whole to be divided equally among the children. If the number of children entitled to payment be subsequently reduced to less than four, the payment is to be correspondingly diminished. (4) If a widow dies or remarries payment thereafter is to be made to the child or children, subject to subdivision 9, following. (5) If there be no widow or children, parents partly dependent shall receive 15 per cent.; wholly dependent, one parent 25 per cent., two parents 40 per cent. (6) Where there is no widow, child or parent, payment is to be made to a brother, sister, grandparent or grandchild, wholly dependent, as follows: If but one, 20 per cent.; if more than one, 30 per cent., to be divided equally among the dependents. If no such relative is wholly dependent and there are those partially dependent, 10 per cent. is to be paid, to be divided equally. (7) The foregoing subdivisions (1 to 6) apply only to dependents residing in the United States or Canada, and provision is made for payments in lump sums to non-resident dependents, provided there be no resident dependent. Detailed provision is made for favoring a non-resident widow. (8) Where the monthly payment for a death is not more than $15, the employer must pay $75 toward burial expenses; where no compensation is paid for death [as, for example, in the case of an employee injured by his own fault or while intoxicated], the employer is to pay reasonable burial expenses, not exceeding $150. (9) Payments cease on the death or marriage of a dependent, and payments to children cease when they reach the age of 16.

(B) For permanent total disability, the payment is to be 50 per cent. during the remainder of the employee's life. Total disability is defined as loss of both eyes, both feet, etc.

(C) Temporary total disability, 50 per cent. during its continuance.

(D) Permanent partial disability (1) 50 per cent., as follows: loss of arm, 72 months; loss of hand, 57 months; one leg, 66 months; one foot, 48 months; permanent and complete loss of hearing, 72 months; in one ear, 36 months; loss of one eye, 30 months; and so on down to the loss of one finger, one toe or one phalanx of a thumb. (2) For other injuries not specified payments are to be made proportionately, but not in any case more than for 72 months.

(E) Temporary partial disability, the employee being unable to secure work, 50 per cent., but not longer than for a permanent partial disability of the same character. If the employee refuses work offered, he shall receive no pay during the continuance of such refusal. If he works at reduced wages he shall receive pay in proportion.

No payment is to be made to an injured employee while he is at work and receiving pay equal to 90 per cent. of his regular wages; receiving less than 90 per cent., he can be paid the difference, but not over 50 per cent. of his regular wages. The time during which he is thus at work is to be deducted from the aggregate period for which payments otherwise would be made.

Section 23. If an injured employee dies after 14 days of disability the employer is liable for death payments, the amount to be determined by computing the amount which would have been due on account of death and making an equitable deduction; but if an employee, sustaining permanent partial disability, should die from a cause other than the injury, the liability of the employer is not to exceed the unpaid balance which would have been due if the injured employee had lived.

Section 24 provides for adjusting the compensation where an employee suffers two different injuries and for combining the periods of time prescribed during which payment is to be made.

Section 25 provides for joint payment where a person is employed by two or more employers subject to this act, and also for cases where there are two employers and one of them is not subject to the act; but such joint employers may agree as to the distribution of the joint burden.

Section 26 provides for the giving of suitable receipts by beneficiaries.

Section 27 defines the terms "dependent," "injury," "employee," "physician," "child," "disability," etc. "Employee" includes an apprentice, but does not include casual employees. "Disability" is want of capacity, by reason of injury, to make full wages and full time. An employee of an interstate carrier shall be presumed prima facie to be engaged in interstate commerce.

Section 28 excludes an employee not engaged in, on or about the premises occupied by or under the control of the employer, with certain exceptions. Injuries caused by the willful act of another, directed against the employee for reasons personal to the employee, are excluded. Disease or infection shall not be included, except if it shall result from the injury when reasonably treated.

Section 29. After payments have continued for six months, either party may apply to the court for an order commuting the further payments to a lump sum. The court, sitting without a jury, may grant such application if it deems the proposal for the best interests of the beneficiary, or if the continuance of monthly payments will entail undue burden on the employer, or if the beneficiary has removed from the United States. The court must calculate the lump sum according to the probable future payments capitalized at 5 per cent.

Section 30. The law does not affect rights of action accruing before it takes effect.

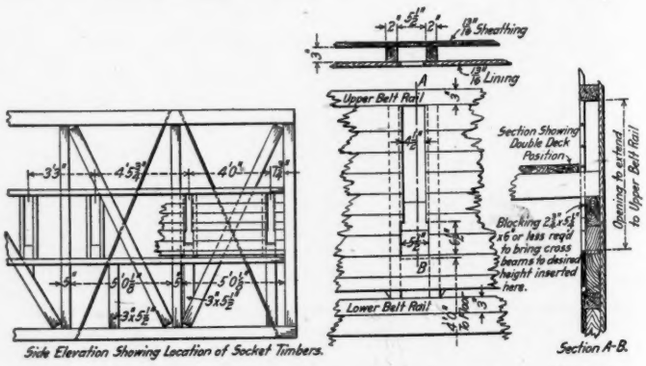
Section 31. It is the policy of Congress that the burden of this law shall be considered as an element of the cost of transportation, and the Interstate Commerce Commission must recognize this policy.

Section 32. Employers must make regular reports to the Interstate Commerce Commission, according to regulations to be prescribed by the commission; and the commission must publish the results of such reports.

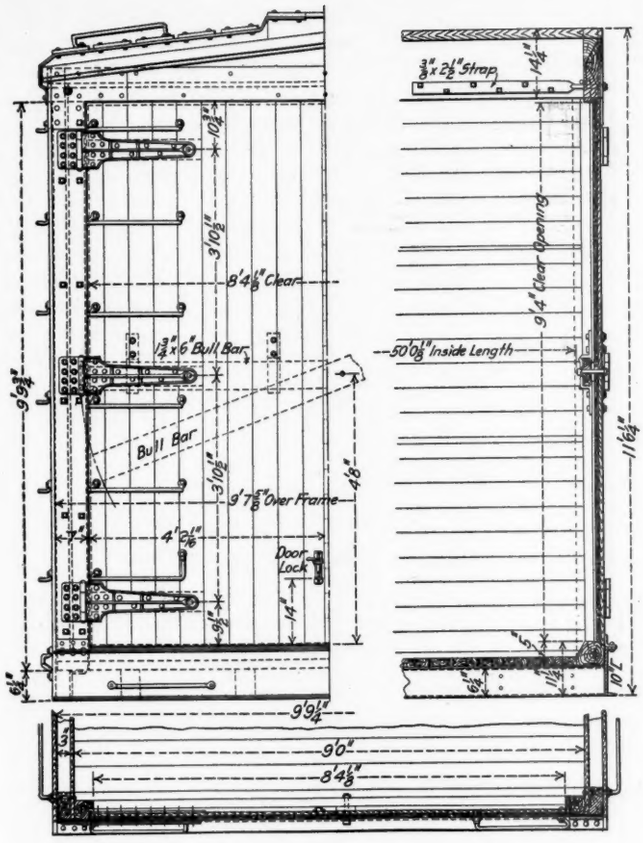
Section 33. The act shall take effect July 1, 1912.

## AUTOMOBILE CAR FOR THE CHICAGO, MILWAUKEE & ST. PAUL.

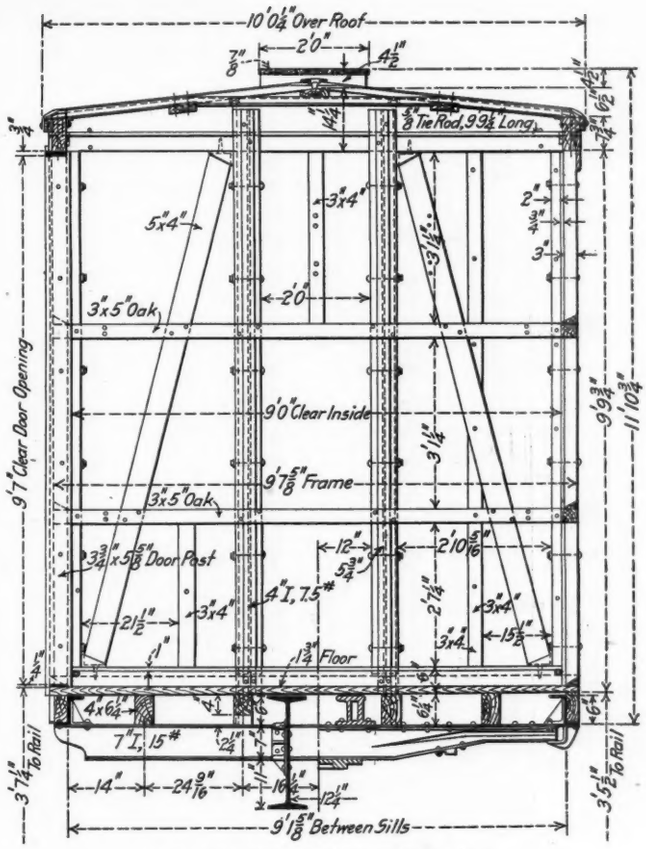
The automobile business in the Northwest has grown to such an extent that the Chicago, Milwaukee & St. Paul finds it necessary to build large numbers of special box cars for this trade. It is now constructing 470 fifty-foot automobile cars at the Milwaukee shops, with underframes and trucks designed for a car capacity of 80,000 lbs. The general plan and some of the principal details are here illustrated. In addition to the unusual length the car is very high, measuring 10 ft. 6¾ in. from the floor to the carline, thus providing a capacity of 4,675 cu. ft. The Bettendorf steel underframe is used, and is 50 ft. 10 in. long by 9 ft. 7⅝ in. wide. The center sills consist of two 24-in.


Sheathing
Lining
Upper Belt Rail
Section Showing Double Deck Position
Blocking 2¾"x5½" 16 or less reqd to bring cross beams to desired height inserted here.
Opening to extend to Upper Belt Rail
Lower Belt Rail
Side Elevation Showing Location of Socket Timbers.
Section A-B.

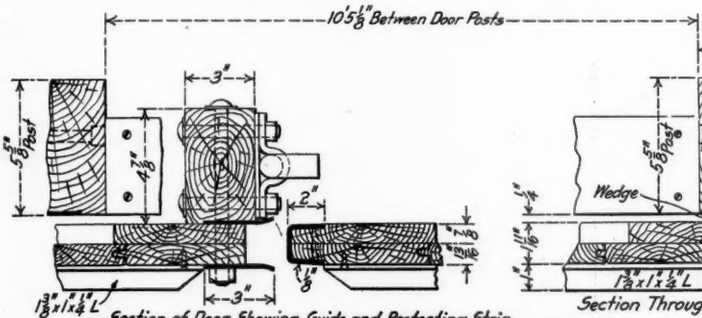
**Arrangement of Double Deck Supports for Automobile Car.**

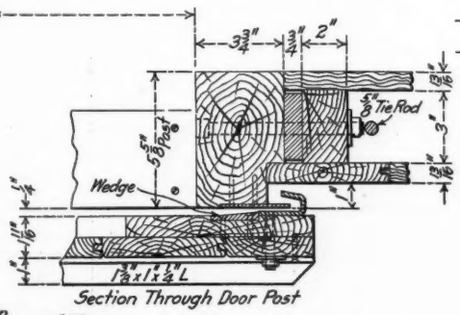


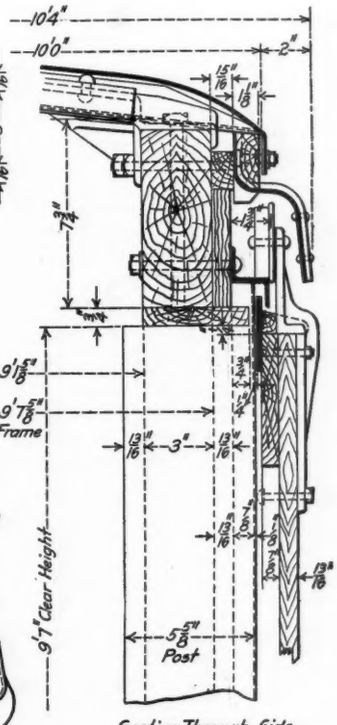

Construction of End Door on Automobile Car.

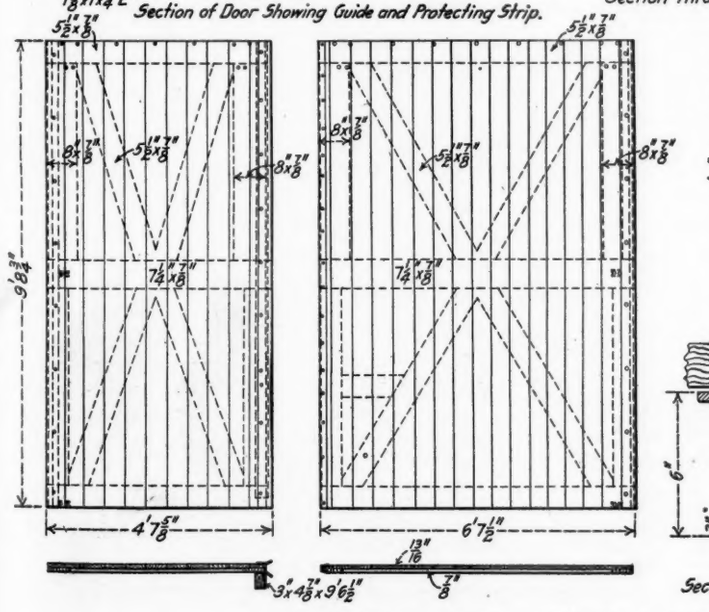


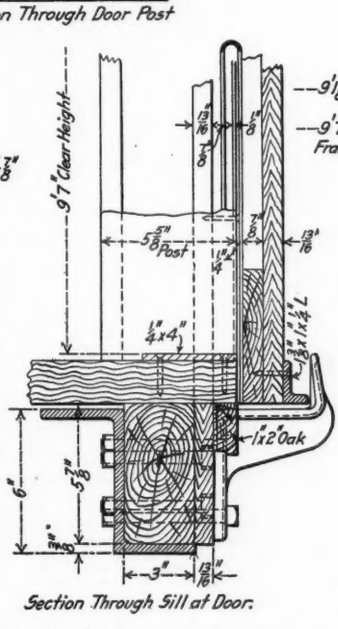

Cross-Section of Automobile Car.



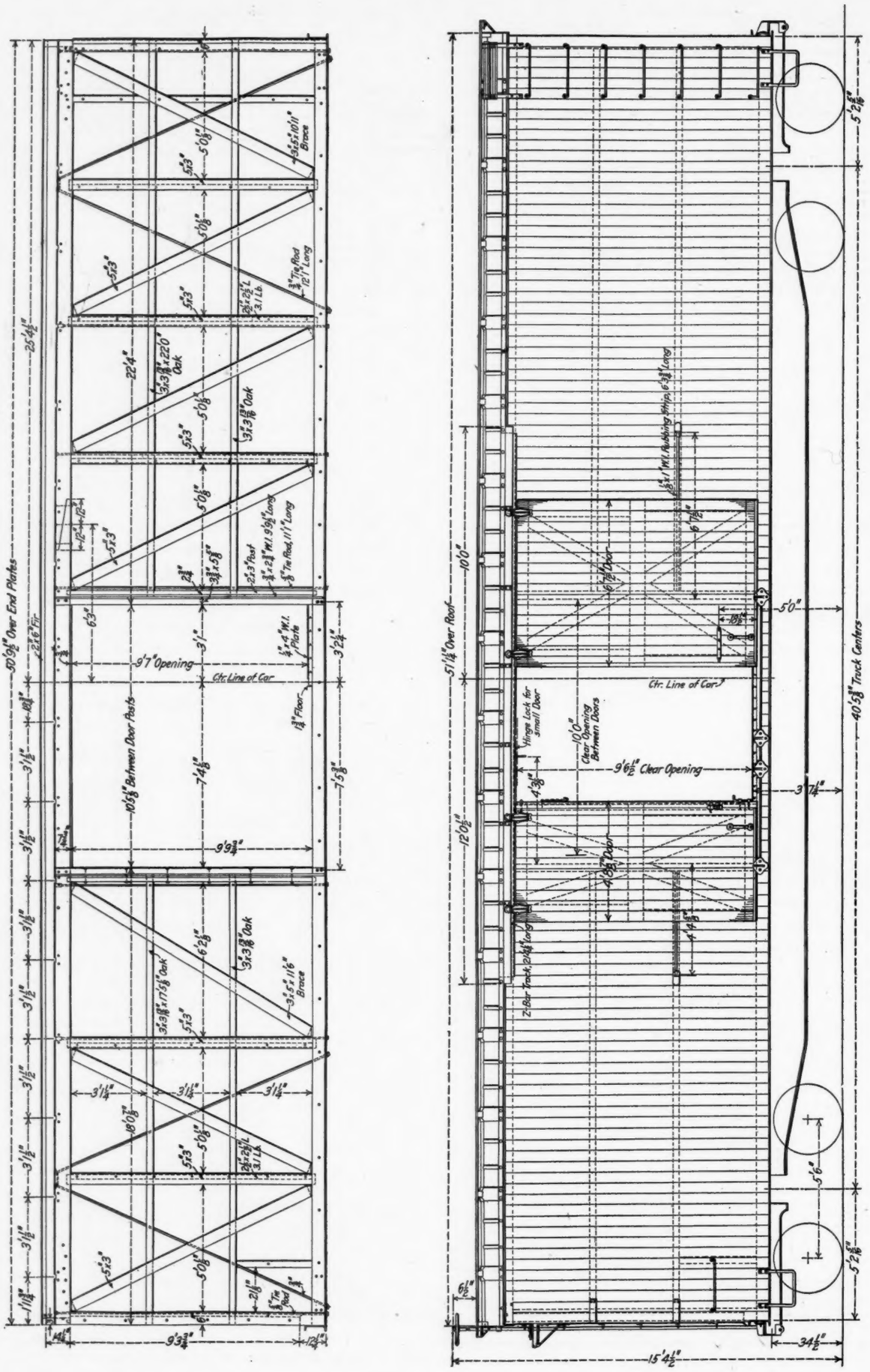




Side Doors of Automobile Car and Details of Their Construction.




Elevations of 50-ft. Automobile Car for the Chicago, Milwaukee & St. Paul.

I-beams, tapered at the ends near the body bolster with separate draft sills beyond the bolster. The side sills are 6-in. Z-bars, with 3 in. x 6 in. nailing strips. The load is carried principally by the center sills, cross bearers made of 7-in. 15-lb. I-beams connecting the side and center sills. The end sills are 10-in. channels. The Miner friction draft gear and the Major couplers are set well up near the floor line, the top of the floor being only 3 ft. 7¼ in. from the top of the rail. This makes the height from the rail to the running board 14 ft. 10 in., and to the brake staff 15 ft. 4½ in. The side posts and braces are made of oak, 3 in. thick x 5 in. wide; the posts are reinforced on one side by 2½ in. x 2½ in. angles. The center posts at the ends are 4 in., 7½-lb. I-beams with 3 in. x 4 in. white oak pieces bolted to each side. The corner posts are double, and at one end are faced on the outside by 7 in., 9.75-lb., channels, to which the heavy hinges for the end doors are riveted. The end plate is faced with a 7 in. x ½ in. iron plate.

The special provisions for loading automobiles, include doors at one end of which allow the full width of the car to be opened, wide doors at each side, and an adjustable double deck. These features have been worked out in an original manner, and are clearly shown in the detail drawings. Each end door is fitted with three large malleable iron strap hinges, with each butt secured to the channel post with 8 rivets. The doors are secured by a 1¾ in. x 6 in. bull bar, which swings on a pivot bolt fixed in one of the doors, the ends of the bar entering notches in the corner posts.

There are two doors on each side which provide a clear opening of 10 ft. when both are opened. One of them is 4 ft. 8⅞ in. wide, and the other is 6 ft. 7½ in. wide. The wider door covers the central opening as in ordinary box cars, and the narrow door is to the left in each case so that their centers are on a diagonal line with respect to the floor plan. The intermediate door post is made of oak, 3 in. thick x 5⅝ in. wide, and is arranged to be made fast with the narrow door when the wide opening is not needed. The car is then equivalent to one with central side door openings 6 ft. wide on each side. This feature of securing the narrow doors with a substantial post fitted between the floor and side plate is patented. The detail drawing shows the narrow door bolted to the intermediate post; the edge of the door is fitted with ⅛ in. protecting strips into which the edge of the wide door fits.

Provision is made for the installation of a temporary double deck, as shown in one of the illustrations, in order to load the car more nearly to its capacity and to the best advantage. The inside lining is nailed to furring strips which are specially arranged for the insertion of blocking to support the cross bearers for the temporary deck. The height of the deck may be regulated by the number of blocks which are placed in these sockets. The belt rail is supported by special posts directly below the blocking. The cars are fitted with the Bettendorf boltless trucks, the weight with these trucks being 46,800 lbs. Other fixtures include the Westinghouse air brakes, Hutchins' metallic roof and Security side door fixtures.

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A contract has been signed by the minister of public works on the part of the Venezuelan government and Federico Brandt, which provides for constructing a new railway from Caracas east to Guatire, passing through Guarenas and other points not mentioned in the concession now held by the Central Railway. The contract provides that the holder of the concession has the right, within five years, to prolong the line to Caucagua, and also to continue it to Rio Chico. Electric or steam motive power may be used. The gage of the road is to be 3 ft. 2 in., the minimum radius of the curves is to be 65 yds., and the maximum grade 3 per cent. It is said that German capital will be used for constructing the line. Before becoming effective this contract must be approved by the congress, and is to be for 99 years. This line will open up a rich agricultural region, and if prolonged to Rio Chico will give access to another seaport from Caracas.

## STATISTICS OF EXPRESS COMPANIES.

The report of the Interstate Commerce Commission herewith abstracted is compiled from the returns made by express companies in their reports to the commission for the year ended June 30, 1910, and is the second annual report on the statistics of express companies. Like the first annual report, it covers statistics of the 13 important companies:

No tonnage reports, such as those in the first annual report, have been required of express companies since December, 1909. The considerable expense involved in the preparation of statistical reports requiring the handling of millions of waybills, has deterred this office from requesting further tonnage reports. Nor does the present report go into sundry collateral matters as did the preceding report. That report, being the first one based on returns rendered by express companies in accordance with accounting rules of the commission, effective on July 1, 1908, contained in addition to purely statistical matter compiled from the returns made by express companies, a discussion of certain other matters connected with express companies and their methods of operation. Such matters not discussed in the present report included the following: Accounting rules; character of express service; operating contracts and practices; computation of express charges; revenue tonnage report.

The present report also omits the appendixes containing an outline of the history, organization, and capitalization of express companies, and analyses and comparisons of graduate tables, rules, etc.

The accompanying table presents a comparative statement of mileage covered in the operations of express companies for the years 1910 and 1909, and while it includes coastwise, river, and lake mileage, it does not include ocean-going mileage, or any mileage in foreign countries, except Canada and Mexico:

MILEAGE OPERATED.

| Name of carrier. | Total mileage. 1910. | 1909. |
|---|---|---|
| Adams Express Co. | 36,495.00 | 34,360.00 |
| American Express Co. | 55,577.84 | 48,224.78 |
| Canadian Express Co. | 7,128.27 | 7,794.27 |
| Canadian Northern Express Co. | 3,314.50 | 3,129.62 |
| Globe Express Co. | 1,915.65 | 1,899.85 |
| Great Northern Express Co. | 8,215.37 | 7,412.16 |
| National Express Co. | 1,640.25 | 1,714.25 |
| Northern Express Co. | 6,862.47 | 6,757.75 |
| Pacific Express Co. | 16,962.43 | 22,672.54 |
| Southern Express Co. | 32,213.00 | 33,181.00 |
| United States Express Co. | 32,771.46 | 24,206.00 |
| Wells Fargo & Co. | 51,522.84 | 65,698.43 |
| Western Express Co. | 3,509.69 | 3,456.39 |
| Total | 258,128.77 | 260,507.04 |

It will be observed that there is a decrease of 2,378.27 miles in the total mileage covered in 1910 as compared with 1909. Mileage on electric railways increased 194.78 miles, while that on steam railways decreased 1,093.01 miles, that on steamboat lines decreased 1,318.04 miles, and that on stage lines decreased 162 miles. The decrease in mileage on steam railways is largely caused by the withdrawal of Wells Fargo & Co. from certain railway lines in Mexico. The decrease in steamboat line mileage is accounted for by an assignment of mileage to ocean-going instead of coastwise mileage. Stage line mileage decreased owing to the abandonment of lines.

Of the total mileage on steam railways covered by the operations of these companies on June 30, 1910, 225,179 miles, or over 94 per cent., were in the United States, the remainder being in Canada and Mexico.

During the year covered by this report there were various changes in express companies operating over important lines of railway, and the foregoing table is of interest in showing the increases or decreases in mileage of the respective express companies occasioned by such changes. On April 1, 1910, the American Express Co. extended its service over the Union Pacific, the Oregon Railroad & Navigation Co.'s lines, and the Oregon Short Line, the Pacific Express Co. retiring therefrom.

On January 2, 1910, the United States Express Co. began operations over the St. Louis & San Francisco, the Kansas City,

Fort Scott & Memphis, the Chicago & Eastern Illinois, and several less important lines. On March 1, 1910, it also acquired the express privileges over the Choctaw, Oklahoma & Gulf, Wells Fargo & Co. withdrawing from all the lines named.

On May 1, 1910, Wells Fargo & Co. retired from the Colorado & Southern, being succeeded thereon by the Adams Express Co.

The accompanying table contains a comparative statement of the cost of real property and equipment used in operation by the express companies as of June 30, 1910 and 1909. An increase in total cost of $3,012,093.41 will be noted, the total for 1910 being $25,325,668.94, against $22,313,575.53 for 1909, an increase of 13.50 per cent.

All companies save two, the Pacific Express and the Southern Express, show an increased investment, the American Express Co. showing the greatest increase, $1,588,604. Part of this sum, however, does not represent additional money put into the plant during the period. For 1909 the value of all equipment owned by that company was carried on its books at a nominal valuation of $1,000,000; that amount has now been adjusted to the inventory value of the equipment, which was given in 1909 as $2,367,369.91. It thus appears that the actual increase in investment was $221,234, made up of $96,198 increased cost of real property and $125,036 increased investment in equipment.

Until forbidden to do so under the rules prescribed in the classifications of accounts issued under orders of the Interstate Commerce Commission, it was the practice of many express companies to charge all purchases of equipment to operating expenses, regardless of whether articles so purchased took the place of existing equipment or added to the capital assets of the companies. It was by this method that the American Express Co. accumulated additional equipment worth over a million and a third of dollars. Such an accumulation of assets through charges to operating expenses is equivalent to a concealment of profits to that extent.

As shown in table of inventory values [abstracted] the book values of the total assets of the 13 companies amount to $204,710,036.91; and the record value of all property used in operation by the express companies is but 12.37 per cent. of their total assets. The significance of this fact should not escape attention, indicating, as it does, the peculiar business conditions of express companies. Given express privileges over transportation lines, the express business may be conducted with but small capital invested.

The table is of interest to those who would make a study of the express business, showing, as it does, the important items which go to make up the equipment necessary to handle the business. It may be of interest to observe that the number of horses and other draft animals increased 1,316, in spite of the fact that 62 more automobiles were used. Stated in items of percentage, the number of draft animals increased 7.59 per cent., and the number of automobiles 24.22 per cent. As two companies, the Northern Express Co. and Wells Fargo & Co., began the use of automobiles during the present year and installed only eight, this indicates that the automobile is coming to be more extensively used by those express companies which had them in service in the previous year.

Many comparisons may be made as to the relation of equip-

COST OF REAL PROPERTY AND EQUIPMENT OF TOTAL 13 COMPANIES AND OF FOUR IMPORTANT COMPANIES.

| Accounts. | Grand total. | | Adams Express Co. | | American Express Co. | | United States Express Co. | | Wells Fargo & Co. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total cost to June 30, 1910. | Total cost to June 30, 1909. | Total cost to June 30, 1910. | Total cost to June 30, 1909. | Total cost to June 30, 1910. | Total cost to June 30, 1909. | Total cost to June 30, 1910. | Total cost to June 30, 1909. | Total cast to June 30, 1910. | Total cost to June 30, 1909. |
| I. Real estate used in operation ..... | | | | | | | $1,366,104 | | $734,817 | $627,888 |
| II. Buildings and fixtures used in operation ..... | $15,890,048 | $14,999,211 | $3,992,599 | $3,761,819 | $7,448,571 | $7,352,373 | 169,873 | $1,321,906 | 1,207,554 | 1,111,646 |
| III. Equipment: | | | | | | | | | | |
| 1. Cars ..... | 401,188 | | ..... | ..... | ..... | ..... | ..... | ..... | 380,168 | 208,465 |
| 2. Horses ..... | 2,720,975 | 7,314,363 | 614,022 | 587,700 | 870,341 | 1,000,000 | 443,733 | 324,688 | 558,047 | 515,931 |
| 3. Vehicles ..... | 2,515,967 | | 869,115 | 825,500 | 601,790 | | 332,008 | 282,778 | 485,567 | 452,024 |
| 4. Other equipment. | 3,797,488 | | 985,671 | 975,880 | 1,020,273 | | 462,976 | 381,833 | 885,782 | 868,128 |
| Total ..... | $25,325,668 | $22,313,575 | $6,461,407 | $6,150,899 | $9,940,977 | $8,352,373 | $2,774,695 | $2,311,207 | $4,251,939 | $3,784,084 |

STATEMENT SHOWING INVENTORY VALUE OF EQUIPMENT OWNED.

| | Grand total. 13 Companies. | | Adams Express Co. | | American Express Co. | | United States Express Co. | | Wells Fargo & Co. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1910. | 1909. | 1910. | 1909. | 1910. | 1909. | 1910. | 1909. | 1910. | 1909. |
| Cars: | | | | | | | | | | |
| Number ..... | 138 | 120 | ..... | ..... | ..... | ..... | ..... | ..... | 124 | 99 |
| Inventory value ..... | $401,888 | $232,116 | ..... | ..... | ..... | ..... | ..... | ..... | $380,169 | $208,466 |
| Office furniture and fixtures—value ..... | $1,041,773 | $1,135,126 | $328,888 | $427,864 | $270,315 | $267,302 | $90,260 | $79,615 | $214,814 | $225,778 |
| Horses and other draft animals: | | | | | | | | | | |
| Number ..... | 18,648 | 17,332 | 4,072 | 3,918 | 5,504 | 4,972 | 3,643 | 3,064 | 3,079 | 3,054 |
| Inventory value ..... | $2,833,350 | $2,499,781 | $614,022 | $587,700 | $870,342 | $760,704 | $443,733 | $324,689 | $558,048 | $515,932 |
| Vehicles—number: | | | | | | | | | | |
| Automobiles ..... | 318 | 256 | 236 | 212 | 24 | 9 | 50 | 35 | 7 | ..... |
| Double wagons ..... | 3,671 | 3,667 | 751 | 770 | 977 | 1,007 | 715 | 710 | 746 | 708 |
| Single wagons ..... | 9,938 | 9,790 | 2,580 | 2,564 | 2,703 | 2,776 | 1,636 | 1,569 | 1,499 | 1,429 |
| Sleighs ..... | 3,016 | 2,878 | 558 | 550 | 1,337 | 1,340 | 395 | 371 | 318 | 227 |
| Total equipment, value.. | $9,830,815 | $9,150,795 | $2,351,809 | $2,372,846 | $2,492,406 | $2,367,370 | $1,238,718 | $989,301 | $2,309,566 | $2,044,551 |

INCOME ACCOUNT AND PROFIT AND LOSS ACCOUNT.

| INCOME ACCOUNT. | Grand total. | | Adams Express Co. | | American Express Co. | | United States Express Co. | | Wells Fargo & Co. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1910. | 1909. | 1910. | 1909. | 1910. | 1909. | 1910. | 1909. | 1910. | 1909. |
| Express privileges ..... | $69,917,562 | $64,032,127 | $16,494,960 | $14,938,228 | $16,677,941 | $14,545,778 | $8,308,220 | $7,788,730 | $12,866,364 | $11,370,662 |
| Operating expenses .... | 61,690,473 | 56,273,055 | 13,086,248 | 12,079,188 | 16,864,491 | 14,902,675 | 8,841,420 | 8,387,996 | 10,949,561 | 9,698,690 |
| Taxes ..... | 1,126,726 | 906,520 | 202,234 | 145,184 | 302,166 | 271,171 | 92,216 | 102,353 | 187,618 | 132,820 |
| Operating income ..... | 13,392,082 | 11,387,489 | 2,027,528 | 1,697,501 | 2,623,849 | 2,176,873 | 448,031 | 582,547 | 3,183,475 | 3,262,479 |
| Other income ..... | 5,633,792 | 5,160,946 | 1,862,380 | 1,684,970 | 1,162,167 | 1,119,291 | 385,029 | 413,782 | 1,641,067 | 1,401,900 |
| *Net corporate income.. | 17,988,557 | 15,382,554 | 2,925,707 | 2,382,294 | 3,785,802 | 3,276,352 | 803,929 | 883,608 | 4,824,541 | 4,664,379 |
| Dividends declared from current income ..... | 5,928,104 | 4,326,939 | 1,213,680 | 1,012,200 | ..... | ..... | 600,000 | 400,000 | 1,598,370 | 800,000 |
| Gross receipts from operation ..... | $146,116,316 | $132,599,191 | $31,810,971 | $28,860,100 | $36,468,447 | $31,896,497 | $17,686,888 | $16,861,626 | $27,178,652 | $24,464,651 |
| PROFIT AND LOSS ACCOUNT. | | | | | | | | | | |
| Dividends declared out of surplus ..... | $26,775,727 | $2,223,090 | ..... | ..... | $2,119,200 | $2,119,200 | ..... | ..... | $24,000,000 | ..... |

*Since Adams Express Co. is the only company which has any fixed charges to speak of, gross income and net income for the others are just about the same figure. Adams Express Co. had $860,581 interest on funded debt in 1910 and $921,247 in 1909.

ment to the volume of business transacted by the respective companies. For example, the total receipts from operation of the United States Express Co., with 3,643 draft animals and 50 automobiles, were $17,689,888. Those of Wells Fargo & Co., with 3,079 draft animals and seven automobiles, were $27,178,652, showing that the number of items of any given class of equipment does not necessarily increase in proportion to the gross receipts from operations.

The foregoing table [abstracted] presents a comparative statement of the income account and the profit and loss account for the years ended June 30, 1910 and 1909. The items covered by this table have been changed from the list used in the first annual report so as to agree with the changes in the annual report form for 1910.

It will be noted that the Pacific Express Co. shows the remarkable increase of 200 per cent. in operating income. This is accounted for by the fact that in 1909 this company charged to express privileges an additional payment of $800,000 for "Extra facilities furnished," which amount was distributed among the three railway companies which owned the capital stock of the express company in the following amounts:

| | |
|---|---|
| Missouri Pacific Ry. Co. | $320,000 |
| Wabash R. R. Co. | 160,000 |
| Union Pacific R. R. Co. | 320,000 |

The effect of thus burdening the "Express privileges" account with an amount which apparently might properly have been charged to accumulated surplus was that operating income showed only a comparatively small amount, and, by comparison, the figures for 1910 appear abnormal.

Reverting to the consolidated statement for all companies it is found that the total "Other income," covering the net profit from separately operated properties, dividends on stocks owned or controlled, interest on funded debt owned or controlled, income from other permanent investments, and like items, amounted to $5,633,792, an increase over the corresponding amount for 1909 of $472,847. By comparison it is found that income from investments equals 42 per cent. of income from operations, emphasizing the well-known fact that express companies are large investors.

Deducting interest on funded debt, other interest, and similar deductions, the net corporate income of express companies is found to be $17,988,557, an increase over the preceding year of $2,606,004, or nearly 17 per cent. From this $17,988,557, dividends amounting to $5,928,103 were declared; $47,561 worth of additions and betterments of property used in operation were added; $50,000 was added to reserves; and $3,000 to miscellaneous appropriations; the remainder, $11,959,891, being carried to the profit and loss account as a credit.

Dividends declared from current income increased from $4,326,939 in 1909 to $5,928,103 in 1910, an increase of $1,601,164, or over 37 per cent. Dividends declared from surplus in 1909 amounted to $2,223,089 and in 1910 to $26,775,726, an increase of $24,552,637, or over 1,104 per cent., of which amount Wells Fargo & Co. contributed $24,000,000. The net amount of undivided surplus remaining to the credit of profit and loss in 1910 was $59,215,600, compared with $50,525,228 in 1909, an increase of $8,690,372, or over 17 per cent.

The preceding table presents an analysis of the gross receipts from operation, which were stated in the income account to be $146,116,315, and shows the separate accounts with the amount credited to each. The total amount of revenue from transportation for 1910 was $143,445,250, compared with $130,165,602 for 1909, and total revenue from operations other than transportation $2,671,065, compared with $2,433,588 for 1909, the later item increasing a little less than 10 per cent., and the former slightly more than 10 per cent.

The greatest increase in any single item shown as non-transportation was that of $69,373 in the revenue from C. O. D. checks. The table shows the relative importance to the express companies of transportation and other services which they render to the public.

The balance sheet contains not only a consolidated statement for all companies, but a separate statement of assets and liabilities for each of the 13 companies covered by this report.

The consolidated statement shows the book value of the property devoted to the express business as of June 30, 1910, to be $25,325,668, the operating income for the year 1910 was $13,392,081. It therefore appears that the $25,325,668 investment returned nearly 53 per cent. Attention has already been directed to the fact that the book value of all property used in operation by the express companies is but 12.37 per cent. of their total assets.

It will be observed that total assets show an increase over

ANALYSIS OF OPERATING REVENUES FOR THE YEARS ENDED JUNE 30, 1910 AND 1909.

| Account. | Grand total. | | Adams Express Co. | | American Express Co. | | United States Express Co. | | Wells Fargo & Co. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1910. | 1909. | 1910. | 1909. | 1910. | 1909. | 1910. | 1909. | 1910. | 1909. |
| I. Revenue from transportation: | | | | | | | | | | |
| 1. Express revenue.. | $143,417,124 | $130,130,126 | $31,631,433 | $28,704,763 | $35,167,561 | $30,759,578 | $17,433,839 | $16,603,843 | $26,716,963 | $24,026,606 |
| 2. Miscellaneous transportation revenue. | 28,126 | 35,475 | ..... | ..... | ..... | ..... | ..... | ..... | 3,495 | 632 |
| Total rev. from transportation. | $143,445,250 | $130,165,602 | $31,631,433 | $28,704,763 | $35,167,561 | $30,759,578 | $17,433,839 | $16,603,843 | $26,720,459 | $24,027,238 |
| II. Revenue from operations other than transportation: | | | | | | | | | | |
| 3. Customhouse brokerage fees ..... | $131,274 | $118,707 | ..... | ..... | $86,078 | $44,831 | $13,121 | $12,462 | $26,514 | $52,547 |
| 4. Order and commission department. | 3,680 | 4,672 | ..... | ..... | ..... | ..... | ..... | ..... | 3,680 | 4,672 |
| 5. Rents of buildings and other property | 72,934 | 57,141 | $148 | $270 | 42,425 | 27,696 | 14,582 | 17,584 | 8,755 | 2,616 |
| 6. Money orders—Domestic ..... | 707,471 | 654,540 | 38,688 | 34,344 | 227,476 | 222,491 | 73,778 | 74,204 | 149,214 | 132,258 |
| 7. Money orders—Foreign ..... | | | ..... | ..... | 1,266 | 1,540 | 1,357 | 833 | 643 | 471 |
| 8. Traveler's cheques—Domestic ..... | 70,527 | 16,473 | ..... | ..... | 6,091 | 5,098 | 1,039 | 453 | 14,323 | 10,849 |
| 9. Traveler's cheques—Foreign ..... | | 46,606 | ..... | ..... | 46,869 | 44,555 | 1,129 | 1,601 | | ..... |
| 10. "C. O. D." checks | 977,467 | 908,094 | 131,673 | 113,893 | 250,471 | 235,849 | 132,811 | 132,136 | 231,048 | 208,559 |
| 11. Telegr. transfers.. | 10,447 | 14,026 | ..... | ..... | 3,731 | 3,463 | 945 | 2,177 | 5,759 | 8,371 |
| 12. Letters of credit.. | 4,625 | 6,961 | ..... | ..... | 4,351 | 6,952 | 273 | 9 | ..... | ..... |
| 13. Other rev.—Financial department.. | 515,720 | 476,298 | ..... | ..... | 485,835 | 445,758 | 17,009 | 16,318 | 12,816 | 14,102 |
| 14. Miscellaneous rev. | 176,918 | 130,064 | 9,026 | 6,828 | 146,287 | 98,680 | ..... | ..... | 5,434 | 2,963 |
| Total rev. from operations other than transport'n | $2,671,065 | $2,433,588 | $179,537 | $155,337 | $1,300,885 | $1,136,918 | $256,048 | $257,782 | $458,192 | $437,411 |
| Gross receipts from operation ..... | $146,116,315 | $132,599,190 | $31,810,970 | $28,860,100 | $36,468,447 | $31,896,497 | $17,689,887 | $16,861,625 | $27,178,651 | $24,464,650 |
| Express privileges—Dr.. | 69,917,561 | 64,032,126 | 16,494,960 | 14,938,227 | 16,677,940 | 14,545,778 | 8,308,220 | 7,788,729 | 12,866,364 | 11,370,662 |
| Total operating rev. | $76,198,753 | $68,567,064 | $15,316,010 | $13,921,872 | $19,790,506 | $17,350,719 | $9,381,667 | $9,072,895 | $14,312,287 | $13,093,988 |

1909 of $18,482,656, or nearly 10 per cent., and that holdings of stocks and bonds, as well as cash and current assets, have largely increased. An increase in capital stock liability of $16,166,600 may also be noted. This is explained by the fact that Wells Fargo & Co. increased its capital stock during the year covered by this report from $8,000,000 to $23,967,400, and the Canadian Express Company issued $199,200 of additional shares.

On December 23, 1909, the directors of Wells Fargo & Co. declared a special dividend of 300 per cent., and voted to increase the capital stock to $24,000,000. As of the date of this report, all of this stock, except shares to the par value of $32,600, was outstanding.

GENERAL BALANCE SHEET STATEMENT AS OF JUNE 30, 1910 AND 1909.

ASSETS.

| Item. | Grand total. | | Adams Express Co. | | American Express Co. | | United States Express Co. | | Wells Fargo & Co. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1910. | 1909. | 1910. | 1909. | 1910. | 1909. | 1910. | 1909. | 1910. | 1909. |
| Expenditures for real property | $15,890,048 | $14,999,211 | $3,992,599 | $3,761,819 | $7,448,571 | $7,352,373 | $1,535,977 | $1,321,906 | $1,942,372 | $1,739,534 |
| Expenditures for equipment | 9,435,620 | 7,314,363 | 2,468,808 | 2,389,080 | 2,492,406 | 1,000,000 | 1,238,717 | 989,300 | 2,309,566 | 2,044,550 |
| Stocks owned | 50,598,202 | 40,879,647 | 23,194,746 | 20,858,184 | 21,246,330 | 14,770,373 | 381,801 | 383,283 | 3,756,506 | 3,211,087 |
| Funded debt owned | 51,513,022 | 45,955,672 | 34,075,936 | 28,328,272 | 5,107,513 | 6,791,093 | 4,230,626 | 4,395,368 | 4,183,762 | 3,750,286 |
| Other permanent investments | 14,220,092 | 26,017,709 | 415,563 | 536,132 | 2,097,250 | 2,175,461 | 3,344,031 | 3,417,089 | 7,930,730 | 19,427,090 |
| Cash and current assets | 45,421,184 | 33,682,608 | 4,805,528 | 1,553,512 | 15,412,288 | 13,741,677 | 3,340,674 | 4,021,411 | 13,529,608 | 7,657,122 |
| Materials and supplies | 332,494 | 138,210 | 15,415 | 10,057 | 115,708 | 33,699 | 48,548 | ..... | 107,555 | 58,990 |
| Sinking, insurance, and other funds | 140,384 | 128,491 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Advance payments on contracts | 5,685,833 | 5,836,666 | ..... | ..... | ..... | ..... | 805,833 | 816,666 | ..... | ..... |
| Franchises, good will, etc. | 10,916,445 | 10,916,703 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Other assets | 547,955 | 266,965 | 156,271 | 210,980 | ..... | ..... | 23,906 | ..... | 362,265 | ..... |
| Profit and loss | 8,752 | 91,129 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Total assets | $204,710,036 | $186,227,380 | $69,124,869 | $57,648,039 | $53,920,068 | $45,864,677 | $14,950,117 | $15,345,027 | $34,122,367 | $37,888,662 |

LIABILITIES.

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Capital stock | $69,523,300 | $53,356,700 | ..... | ..... | $18,000,000 | $18,000,000 | $10,000,000 | $10,000,000 | $23,967,400 | $8,000,000 |
| Funded debt | 36,000,000 | 36,000,000 | $36,000,000 | $36,000,000 | ..... | ..... | ..... | ..... | ..... | ..... |
| Current liabilities | 37,953,220 | 24,980,828 | 7,754,875 | 148,710 | 17,437,131 | 13,059,371 | 3,330,295 | 3,989,325 | 6,212,737 | 5,197,180 |
| Accrued interest on funded debt not yet payable | 153,959 | ..... | 153,959 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Other liabilities | 1,855,203 | 21,273,493 | [1] 1,040,946 | [2] 996,525 | 93,787 | ..... | 133,147 | 102,978 | 285,175 | 19,937,639 |
| Profit and loss | 59,224,353 | 50,616,358 | 24,175,087 | 20,502,804 | 18,389,149 | 14,805,305 | 1,486,674 | 1,252,723 | 3,657,054 | 4,753,842 |
| Total liabilities | $204,710,036 | $186,227,380 | $69,124,869 | $57,648,039 | $53,920,068 | $45,864,677 | $14,950,117 | $15,345,027 | $34,122,367 | $37,888,662 |

[1] Includes $879,678 of excess described in note 2.
[2] Represents excess book value of securities deposited with trust companies over par value of company's bonds outstanding.

STATEMENT OF FINANCIAL PAPER ISSUED DURING THE YEARS ENDED JUNE 30, 1910 AND 1909.

| Item. | Grand total. | | Adams Express Co. | | American Express Co. | | United States Express Co. | | Wells Fargo & Co. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1910. | 1909. | 1910. | 1909. | 1910. | 1909. | 1910. | 1909. | 1910. | 1909. |
| Money orders sold: | | | | | | | | | | |
| Number | 12,516,722 | 11,992,413 | 903,402 | 824,956 | 4,524,148 | 4,467,989 | 1,393,071 | 1,427,029 | 2,053,328 | 1,778,369 |
| Amount | $124,960,284 | $124,303,149 | $9,392,186 | $8,678,502 | $42,959,767 | $42,718,976 | $13,766,682 | $14,467,041 | $24,470,858 | $22,395,862 |
| Traveler's cheques sold: | | | | | | | | | | |
| Number | 1,262,276 | 1,023,723 | ..... | ..... | 1,081,925 | 893,715 | 59,654 | 44,399 | 111,991 | 78,591 |
| Amount | $30,213,900 | $24,589,630 | ..... | ..... | $25,886,000 | $21,293,070 | $1,305,600 | $1,006,070 | $2,836,630 | $2,149,100 |
| "C. O. D." checks issued: | | | | | | | | | | |
| Number | 5,182,875 | 4,867,353 | 764,112 | 660,330 | 1,407,837 | 1,342,790 | 742,253 | 738,930 | 1,116,024 | 995,286 |
| Amount | $55,878,805 | $52,751,369 | $8,708,193 | $7,378,887 | $16,706,361 | $15,645,385 | $8,100,082 | $8,056,577 | $12,242,313 | $10,787,121 |
| Telegraphic transfers: | | | | | | | | | | |
| Number | 12,584 | 10,191 | ..... | ..... | 5,153 | ..... | 1,310 | 2,835 | 6,106 | 7,316 |
| Amount | $1,542,924 | $1,766,078 | ..... | ..... | $718,916 | $608,836 | $103,121 | $256,747 | $720,136 | $898,343 |
| Letters of credit issued: | | | | | | | | | | |
| Number | 856 | 643 | ..... | ..... | 831 | 631 | 25 | 12 | ..... | ..... |
| Amount | $2,320,073 | $1,685,511 | ..... | ..... | $2,239,549 | $1,657,232 | $80,524 | $28,279 | ..... | ..... |
| Miscellaneous: | | | | | | | | | | |
| Number | 860,939 | 630,762 | ..... | ..... | 831,604 | 616,144 | 27,196 | 14,441 | ..... | ..... |
| Amount | $208,415,976 | $169,217,184 | ..... | ..... | $206,679,727 | $168,606,211 | $1,365,057 | $603,303 | ..... | ..... |
| Total: | | | | | | | | | | |
| Number | 19,836,252 | 18,525,085 | 1,667,514 | 1,485,286 | 7,851,498 | 7,321,269 | 2,223,509 | 2,227,646 | 3,287,449 | 2,859,562 |
| Amount | $423,331,964 | $374,312,924 | $18,100,379 | $16,057,389 | $295,190,322 | $250,529,711 | $24,721,069 | $24,418,020 | $40,269,939 | $36,230,428 |

The chamber of deputies of Tunis has sanctioned the new railway loan of $17,616,730. The principal lines to be constructed or completed are a 50-mile line from Graiba to Gabes, a 30-mile line from Tozer to Metlaui—both of these are calculated directly to benefit the natives in the south of the protectorate—thirdly, an electric line from Tunis to Hammam, which is designed to link up the capital with various coast resorts, and fourthly, a 90-mile railway from Tunis to Tebursuk with a branch to Gubillat. The balance of the new loan will be devoted to improving the existing railway services. It is stipulated that all material shall be of French or Tunisian origin.

## RECENT DEVELOPMENTS IN THE UNIT SYSTEM OF ORGANIZATION.

At the meeting of the New England Railroad Club in Boston, December 12, Major Charles Hine, of the Harriman Lines, gave an address on the adoption of the Hine system of organization on those roads. This system is already well known to the readers of the *Railway Age Gazette,* but the discussion of Major Hine's address brought out some recent experiences with it and some answers to criticisms.

In the discussion, the first speaker was Professor William J. Cunningham, of Harvard University and the Boston & Albany Railroad. Last summer Prof. Cunningham spent two months traveling over the Harriman Lines studying the Hine system. He said in part:

On the first principle, consolidation of offices, there was a unanimity of opinion as to its marked success. In every office that I visited, and I saw most of the division offices, they were all heartily in favor of the consolidation of the files, and pooling of the forces. In some of the offices where I spent considerable time and where the files were opened for my inspection, a look was enough to demonstrate the practical advantages. A file that under our ordinary form of organization would have been voluminous with much duplication, would, with the elimination

of inter-office correspondence, be about one half the usual size. In the office of one superintendent there are now something like seventy men, the consolidated forces of the former division master mechanic, the master car repairer, the division engineer, the train master, the chief train despatcher, the division storekeeper, the signal supervisor, the road master, and I believe, the superintendent of bridges and buildings. It made a very formidable looking array of clerks, yet everything was so systematized and worked so smoothly that to see was to believe.

On the second principle, of having a senior assistant at headquarters at all times, there was also a decided unanimity of favorable opinion. It means an extra expense on a great many divisions, because the senior assistant, or the man who took his place outside, is an extra officer, but there was no doubting the justification of the extra expense on the score of increased supervision and the substitution for what Major Hine calls "rule by chief clerk," by having the correspondence handled by a man with a broader experience.

On the third principle, that of co-ordination of rank, title and authority, there is not at the present time—or at least was not last summer—the same unanimity of opinion or the same sympathetic support. This is probably due to the fact that the opportunities of the system are not fully appreciated nor understood. Possibly, too, there is a sort of an undercurrent of feeling that the system is "on trial"—that it may not be permanent. I understand now that these negative influences are being corrected and that there is no question in the minds of the management as to the permanency of the system..

The full fruits of the new system cannot be attained with the present generation of assistant superintendents. A new generation must be trained to bring out its possibilities. Present results are regarded as satisfactory, but not as satisfactory as the originator of the system and the higher authorities have a right to expect. It is reasonable to assume that there will be clashing and ill feeling, but I saw none of it and heard of no trouble on that account. Possibly this happy condition is due to the timidity of the officers to exercise their broadened functions and their fear of the consequences if they should venture outside their own assignments. But after all the fundamental principle is to afford broader training to the division subordinate officers. The system certainly affords that opportunity. If its opportunities are not embraced as they should be, the criticism is not on the system but on its operation; and on the apparent weakness of an officer who feels his authority but not the obligation to act.

T. E. Byrnes (N. Y. N. H. & H.)—It seems to me we should distinguish ourselves between administrative and technical duties. The trained mechanical or civil engineer feels that he is better equipped for his department than the man who has all his life been engaged in the transportation department. The unit system will not reach its full fruition until these assistant superintendents have both technical and administrative training. Suppose the chief of staff has no technical training qualifying him to criticise a letter written by one of the others, and in addition has no special admiration for the mechanical officer who wrote the letter. Would the modification of that letter increase the efficiency of the mechanical department? I believe not. You know how frequently a splendid subordinate is submerged by the fact that the man to whom his recommendation goes does not like the subordinate. When the time comes that the superior is big enough to consider a recommendation on its merits, and also has the skill to pass upon the merits intelligently, the unit system will be perfect. I have known cases when the friction existing between the heads of the various departments has been very embarrassing and I don't believe changing the titles of the individuals will remove the embarrassments arising in such cases. Giving a man a title does not necessarily give a man initiative or capacity. One of the greatest difficulties I have is to make subordinates feel that I want them to give their work their best individuality and effort and not try constantly to find out what I want. If a subordinate has a proposition to present to me I want him to stand up man fashion and defend his proposition, not because it pleases me, but because he believes in his proposition. Nine times out of ten the men are trying to find out what the superior wants instead of asserting their own individual views.

I should like to see introduced into the modern railway, if it were possible, that spirit of the old days that I knew in Vermont when my father was a section boss. It was a common thing for the president of the company and the other general officers to sit down with him and discuss the general policy of the company. This would not be possible today, but suppose we could introduce into the railway world again the spirit of the old Irish section man who felt just as much pride in the management and success of the company as did the president or general manager. It is this spirit that will make railways more efficient and not the spirit so prevalent among some of our organization men whose chief effort seems to be to increase their pay and to so do their work as to make the number of men employed as large as possible. How are you going to change this? I don't know, I think sometimes that if the general officers of these companies could come a little closer to the rank and file and make them feel a personal pride and responsibility in their work it would do much good.

A. W. Martin.—The Major's history of the unit movement leads me to make just one inquiry. What becomes of the superintendent? Over here in the East we don't need so much reorganization, because really, Major, I can sit down at my old desk and in thirty minutes I can lay out an organization and put out a few titles and do all that I see that you have accomplished up to this time; but where does the superintendent come in? Does he have authority? That is what we need in the East. In theory it is all right, but you gentlemen all know that our railroading in the East is done at too long a distance. If the superintendent today wants to lay forty feet of rail to extend a sidetrack, it takes him six months to get the machinery in motion to get it, and a man who asks for a sidetrack is dead before he gets the iron. Give your operating officers in this section of the country a right to go on and do the things that ought to be done, hold them responsible for their action, and if they do well compliment them; if they don't do well, wipe them off the slate and get somebody that will. When you get things done in that way here in New England your railway situation will compare very favorably with the unit system on the Harriman Lines, and until you do do it we are way behind the ages.

Major Hine.—Answering Professor Cunningham's criticisms, I may say that now, with the light of experience, we see that we began at the wrong end. We now advise other roads to begin at the top and work down. In the beginning we had to try one division at a time. We have only just got around to a satisfactory situation in the higher offices. In the new building of the Union Pacific at Omaha we have brought together officers and clerks formerly scattered over the town in seven different buildings. At Houston, Tex., we had to wait for the completion of a new office building. We recognize the difficulties but are not seriously concerned about them. At first our chief objectors were the mechanical and engineering officers, but they now realize that their opportunities are being broadened. The real objectors should be the transportation men, for formerly they had the first chance for promotion in the operating department. One critic asked, "Does not the system help the technical man?" Certainly it does. The technical men should welcome the new plan. If a man is ambitious for a reputation as a civil engineer or a mechanical engineer, if he feels that that is the most important, why, don't bother with a little thing like a railway; go and be associated with some industrial enterprise or hang out a shingle as a consulting mechanical engineer or civil engineer, but don't bother with the railway.

The recent strike has served to cinch the new system on the Harriman Lines, because when the strike came an assistant superintendent was sent to each important point, and he had full authority to act. We had old division road masters and old division engineers organizing gangs of car repairers. I grant

you that you can say, "Well, our division engineer will do it, too," and "our division road master." They do on some roads in some emergencies, but we claim there is less lost motion, that he does not have to go there and apologize for taking action, when that little loss of time may be costing the company money. He does the best he knows how until we can get a man there who is more skilled in the technique of that particular work; but, meantime, are not the company's interests better protected? We have found that they are.

It has been objected that we cheapen the title of assistant general manager; we shall be glad if anyone will invent a better name. Mr. Martin asked what became of the superintendent; he is a bigger man than he was before. He may say to the senior assistant, "Hold up every engineering matter until the maintenance assistant comes back." It is true that we have not yet inculcated a sense of responsibility so fully as we shall do in the future. We feel safe in leaving that. We have perhaps been excessively cautious.

Since last July we have all the division stores under the division superintendents. As we have division accounting, this is a success. A superintendent in California was telling me week before last that he found the division storekeeper the most valuable man on his staff, that he was using him for various purposes, among others he had instituted surprise checks for stationery in agents' offices, which is done by the division storekeeper in addition to his other duties.

The harmonious organization of the Boston & Albany is a matter of favorable comment the country over; but our position is that, as trustees, for the future, we owe it to our stockholders so to organize that there may be a reasonable assurance of a probability of a continuance of those happy conditions, that it should not depend upon the happy accident of having a broad, strong man at the head. If they do happen to make a mistake in selection some time, we are trying to arrange it that we will minimize the harmful effects that may follow. And we do not minimize the importance of the individual. As Mr. Byrnes and Mr. Martin have so well brought out, it all goes back to the man.

It will take another generation to show the full effects of the system, but the officers of the Harriman Lines said, "We will jump in and break the ice, and get as far as we can." I predict that, with the evolution of the system, it will be extended to the legal, traffic and accounting departments.

## OIL BURNING LOCOMOTIVES.*

BY HOWARD STILLMAN,
Mechanical Engineer, Southern Pacific.

The first locomotive converted from a coal burner to an oil burner in regular service, was on the Southern Pacific in November, 1900, and a number of comparative tests proved so satisfactory that in February, 1901, other engines were converted. In about five years all locomotives on the Southern Pacific in California, and on the lines extending to El Paso, Tex., embracing the Calvin Lines, were converted to oil burners. The approximate number of locomotives now burning oil is as follows:

| | |
|---|---|
| Passenger | 396 |
| Freight | 455 |
| Switch | 140 |
| Total | 991 |

On the above basis the oil consumption is 677,875 lb. per month, or 8,134,500 bbl. per year. These figures are for about six months ago and are slightly exceeded at this time. There is a slight variation in the specific gravity of the oil, ranging from 14 deg. to 15 deg. Baumé. Its calorific value is taken at 18,500 B.t.u. The following specifications for fuel oil have been adopted by the Southern Pacific system:

*General Requirements.* Liquid fuel is crude petroleum as received from the wells, or the product of crude petroleum, distilled or reduced. It must contain no sand or foreign matter in the shape of sticks, waste, stones, etc., and must be sufficiently liquid to flow readily in the pipes at a temperature of 70 deg. F. It must contain as little water as possible, and oil containing more than 2 per cent. of water and other impurities will not be accepted. Fuel oil will be paid for on the basis of volume at 60 deg. F., also deducting all water contained, according to the method outlined as follows:

*Tests.* One sample will be taken from each carload or fraction thereof. The sampling is to be made with a car thief having a valve at the lower end. The thief with open valve will be lowered gradually into the car and the valve closed at the instant of touching bottom. The thief thus filled will contain the oil sample to be tested for water, sand, basic sludge, and specific gravity. Oil received in settling or storage tanks will be sampled with the Robinson or other standard thief, a sufficient number of samples being taken to secure an average of its contents.

Fuel oil will not be accepted for general use, the flash point of which is less than 110 deg. F. when tested by the open cup, Tagliabue method. The oil is to be heated at a rate of 5 deg. per min., and the test flame applied every 5 deg., beginning at 90. This flash point being the danger point at which the oil begins to give off inflammable gas, the fire or burning point is not required.

The test for water, sand, and Baumé specific will be made as follows: 100 cu. cm. of the sample will be placed in a 250-cu. cm. graduated glass cylinder provided with a stopper, and thoroughly shaken up with not less than 150 cu. cm. of gasoline. The mixture will be heated to 120 deg. F. for from 3 to 6 hours to facilitate the separation of impurities, the amount of which can then be read from the graduations of cylinder. All proportion of water and other impurities contained in the sample will be deducted from the volume contained in the car and not paid for.

The temperature of the shipment will be tested directly as the sample is removed from the sampling tube, or by immersion of a thermometer in the receptacle itself for not less than one minute. A deduction in volume for expansion at a temperature of over 60 deg. F. will be made at rate of 0.0004 for each degree. At 90 deg., the deduction would be 1⅗ per cent, etc.; Kansas and Oklahoma fuel oil furnished from Sugar Creek or Kansas City, Mo., at 90 deg., should have a deduction of 1¼ per cent. Gravity of fuel oil should range between 13 and 29 deg. Baumé at 60 deg. F.

*Conditions.* If any portion of an accepted shipment is subsequently found to be damaged, or otherwise inferior to the original sample, that portion will be returned to the shipper at his expense. Any sample failing to meet all the requirements of this specification will be condemned, and the shipment represented by it will be returned to the manufacturers, they paying freight both ways.

In the evolution of oil burning in locomotives, the matter unfortunately resolves itself to one of local conditions. The modern locomotive boiler is not an ideal form of oil furnace. Railways must burn whatever fuel is cheapest and most available, and the matter continues to be one largely of expediency. Locomotive fuel oil is carried in tanks built to fit the coal space in the tender and gravity supply is depended upon through flexible pipes to the locomotive. The burner used is of the flat jet type consisting of a flat casting divided longitudinally by a partition over which the oil flows as it is admitted to the upper cavity. The lower cavity receives the steam for the jet which strikes the oil flowing over the partition, spraying it into the furnace. The oil should be completely atomized near the burner tip in order that it may be immediately vaporized. The form of burner is of little importance provided it is simple, easy to clean, and without complication from carbonizing. It has in truth been said that those who try to improve the efficiency of fuel oil by alteration of the burner are on a plane with those who try to improve the steaming quality of a boiler by altering the injector. High efficiency from fuel oil is due mainly to the arrangement of the furnace.

The steam for atomizing is obtained from the dome and is available at full boiler pressure of 200 lb. through a suitable regulating valve. Compressed air has been used experimentally with a form of burner that delivered the air inductively to the burner itself. Other than by a localization of heat at the point of the burner, no benefit could be found by tests with air mingled with the steam in this way. Atomization with compressed air is undoubtedly of value under certain conditions, but is liable to produce a more intense heat locally in the furnace than is desirable. With the steam jet the oil is sprayed and broken up mixing with the air, admitted through proper dampers, and is completely consumed without damage to the sheets. Tests on our locomotives by Prof. Gray, formerly of the University of California, show that temperatures ranging from 2,500 to 2,750 deg. F. are obtained, the latter being the highest observed.

The method of fitting a locomotive fire box for oil burning,

*Abstracted from a paper presented in the August proceedings of the American Society of Mechanical Engineers.

which is the present standard arrangement for the heavy freight engines of the consolidation type, is shown in the illustration. Fire bricks, the most refractory obtainable, are placed at the lower side of the fire-box plates to prevent the oil blast impinging against the sheets. No more bricks are used than are necessary for the purpose. The most refractory bricks melt out in a comparatively short time—not from an intense degree of heat, but from the fluxing agents introduced with the oil, especially salt or other alkalis with which California petroleums are associated.

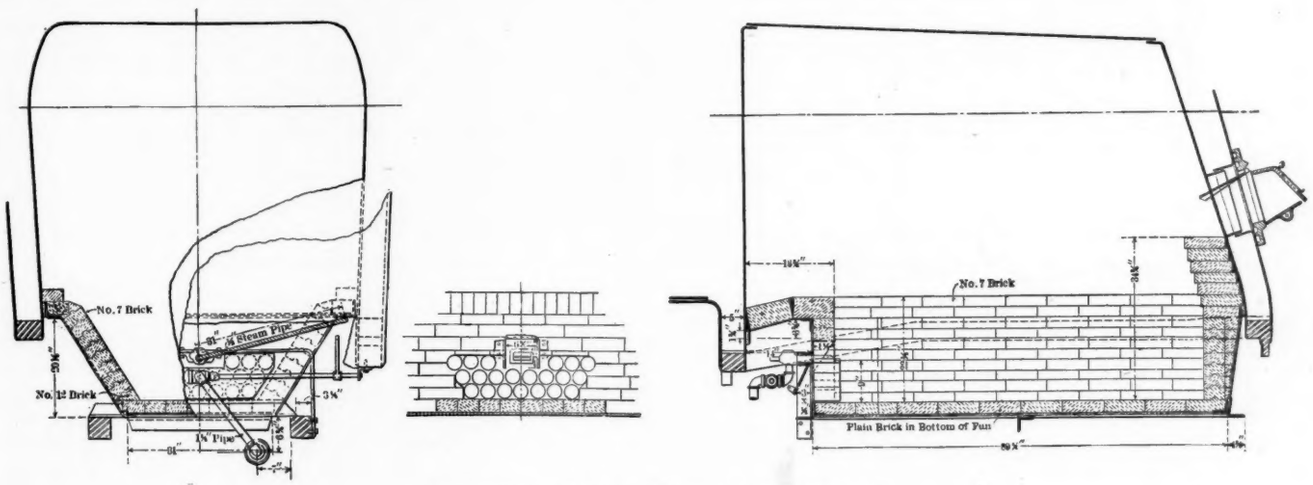
Fire-box repairs to the oil-burning locomotives do not exceed those of the coal-burning engines. From records kept of the cost of maintenance, it is shown that if a furnace is properly equipped with draft adjustment and burner, an oil-burning fire box will outlast a fire box burning coal; that is, on the same class of engines in the same service. However, it cost a good many fire boxes to determine the best arrangement. In this connection the oil fireman is a large factor in successful oil burning on locomotives. He must watch the operation of the locomotive with intelligence and every movement of the engineer demands a corresponding regulation of the fire and watchfulness on the part of the fireman. He has two gages to guide him, the steam gage and the top of the stack, the desired steam pressure with least smoke being the object. It is a general though not universal condition that the locomotive should give some smoke. In general a thin gray smoke is indicative of the most economic result. A careless fireman can do great damage to the fire box and flues if he neglects to attend to the dampers and regulators at the proper time.

It is the writer's opinion that a greater depth of fire box is more essential for economic oil burning than for coal. If combustion is not approaching completion when the gases enter the flues, the vapors in process of combustion fall in temperature below that required for oxidation of the carbon, which is precipitated as soot or black smoke. While this is a common phenomenon of smoke production with any fuel, it is more in evidence with oil than with solid fuel where there is nothing to burn but volatile combustible. Lack of oxygen is generally supposed to be the cause of smoke, but lack of proper temperature required for chemical combination is as often, if not oftener, the cause. The lack of sufficient fire box volume is the common cause of smoke in oil-burning locomotives when demands are made on the boiler for rapid evaporation. The deposit of soot upon locomotive flues is a common difficulty, and calls for the regular operation in service of sanding the flues. The operation of sanding consists in dropping the reverse lever, if possible, while the engine is running, and pulling the throttle wide open, while the fireman puts a few cupfuls of sand through the opening in the fire door, the draft carrying the sand through the flues, ridding them of soot, the operation being repeated if necessary. A supply of sand is carried on the footboard for this purpose. In oil burning the factor of grate surface disappears. The grates are bricked over and air admission regulated through openings and proper dampers.

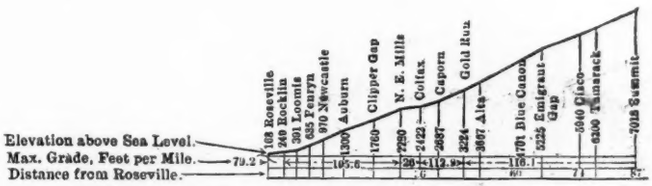
COMPARATIVE TESTS WITH OIL AND COAL.

| Type of Locomotive. | Number in Service. | Evaporation, 2,000 lb. Coal Equivalent to Fuel Oil, Gal. |
|---|---|---|
| Eight-wheel 18-24 | 50 | 144 |
| Ten-wheel | 294 | 151 |
| Mogul | 176 | 146 |
| Twelve-wheel | 67 | 158 |
| Consolidation | 139 | 162 |
| Atlantic | 19 | 144 |
| Mallet | 17 | No coal record. |

The figures shown in the table of comparative tests, are based on evaporative tests made before and after con-




**Locomotive Firebox Fitted for Burning Oil.**




**Profile of Road, Roseville, Cal., to Summit.**

*The accompanying table gives the results of evaporative tests made on oil burning locomotives crossing the Sierra Nevadas, the profile of the division being shown above:*

| Class of engine | 10 wheel | Consolidation | Mallet consolidation |
|---|---|---|---|
| Service | Passenger | Freight | Freight |
| Number of single trips in test | 2 | 2 | 2 |
| Total time of test | 17 hr. 39 min. | 21 hr. 23 min. | 29 hr. 2 min. |
| Actual running time | 13 hr. 55 min. | 12 hr. 59 min. | 18 hr. 11 min. |
| Miles run | 315 | 174 | 174 |
| Average steam pressure (gage), lb. | 196.0 | 196.1 | 194.5 |
| Smokebox temperature, deg. F. | 797 | 738.5 | 451.3 |
| Total lb. water evaporated | 367,642 | 400,858 | 759,058 |
| Total gal. oil burned | 3,951.6 | 4,328.4 | 7,692.1 |
| Total lb. oil burned | 31,613 | 34,627 | 61,537 |
| Equivalent evaporation, lb. water per lb. oil | 14.14 | 13.95 | 15.04 |
| Lb. water evaporated per sq. ft. heating surface per hr. | 8,698 | 8.809 | 6,392 |
| Lb. oil burned per sq. ft. heating surface per hr. | 0.748 | 0.761 | 0.518 |
| Number of cars in train | 7 | 14.5 | 24.5 |
| Weight of train, tons | 342 | 481 | 1,056 |
| Gross ton mileage | 107,730 | 83,694 | 183,744 |
| Lb. water evaported per 1000 ton miles | 3,413 | 4,790 | 4,131 |
| Gal. fuel oil burned per 1000 ton miles | 34.90 | 48.40 | 39.51 |
| Boiler efficiency, per cent | 73.84 | 72.83 | 78.52 |
| Maximum i. h. p. | 1,719 | 1,470 | 2,486 |
| Mean i. h. p. | 1,368 | 1,222 | 2,057 |
| Engine No. | 231 | 2564 | 4001 |
| Size of cylinders, in. | 22 x 28 | 22 x 30 | 26 and 40 x 30 |
| Diameter of drivers, in. | 63 | 57 | 57 |
| Total weight of locomotive, lb. | 203,300 | 208,000 | 425,900 |
| Weight on drivers, lb. | 160,000 | 187,000 | 394,150 |
| Weight of tender, lb. | 138,070 | 134,745 | 169,765 |
| Total heating surface, sq. ft. | 2,994 | 3,403 | 6,394 |
| Feed water heater, heating surface, sq. ft. | ..... | ..... | 1,221 |

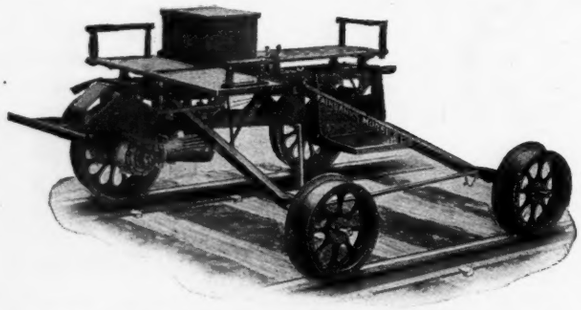
NOTE.—Train weights are the average for the distance hauled and are

exclusive of engine and tender. Tests made under ordinary service conditions. Engines unaided. In "water evaporated and oil burned per sq. ft. heating surface per hr.," the figures are for actual running time; the allowance of 15 gal. of oil and its equivalent in water is made per hr. while standing. In "gal. and lb. oil per ton mi.," a deduction is made of 15 gal. per hr. while standing and 3.5 per cent. of oil for evaporating steam for atomizing oil. Quantity of oil burned corrected to normal temperature of 70 deg. F. All measuring instruments calibrated. Analysis of fuel: Kern River oil; gravity, 15.8 deg. Baumé; flash point, 230 deg. F.; fire point, 278 deg. F.; commercial weight, 8 lb. per gal.

version. The comparisons are with ordinary bituminous coal of about 13,350 B.t.u. The total number of locomotives accounted for is 745, and the mean equivalent is 152 gal. or 3.62 bbl. of 42 gal., equivalent in heat value to 2,000 lb. of coal. The average equivalent figures in the table cover much careful work and are based on equivalent evaporative results from many service tests. It should be borne in mind that the figures are from service tests and represent oil burned on the main line between terminals only and not losses in transfer, handling or firing up, etc. Our accounting department uses a figure of 168 gal., or 4 bbl. of oil, equivalent to one ton of coal. It may be said that with fuel oil, providing the engines are burning it with a fair degree of efficiency, the quality of fuel is a constant factor. Poor or bad coal as accounting for engine failures drops from the delay report and cleaning fires is abolished.

## FAIRBANKS-MORSE ALL-STEEL MOTOR CAR.

Among the recent developments in motor cars is the Fairbanks, Morse & Company No. 28 car, which is a comparatively new design. It is "all steel," the frame being made of sheet steel, sheared and punched to shape, then flanged around so that the top, sides and bottom flanges of the frame are all one. The engine is of the two-cylinder (one on each side of the front



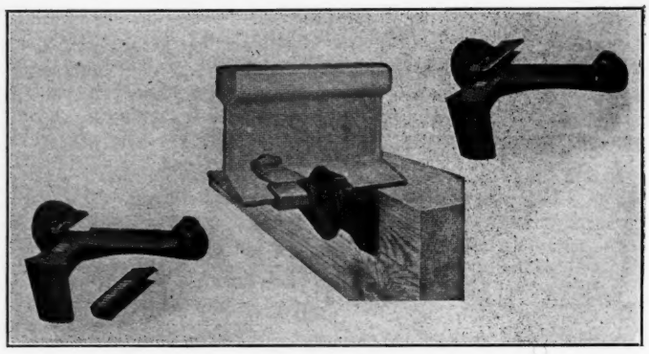
Fairbanks-Morse No. 28 All-Steel Motor Car.

wheel), two cycle air-cooled type, giving great simplicity as well as economy by reason of a small number of wearing parts and consequent small expense of renewals. The engine is direct connected to the front wheel, and will drive the car at any speed from six to 25 miles per hour. The car has a capacity for three people, but it is light and can easily be handled by one man. The car is built by Fairbanks, Morse & Company, Chicago.

## A NEW ANTI-RAIL CREEPER.

The railways have tried numerous means to prevent the bad results of rail creeping, but such means as tamping the joint ties, inserting blocks of wood between the ties and strapping the rails to ties by bolting metal straps to the rails and spiking the ends to adjacent ties, have proved inadequate.

One of the most recent types of anti-creepers which have been developed to successfully stop creeping is illustrated herewith. It is known as the Q & C wedge anti-rail creeper. The device is made of malleable iron or semi-steel, and consists essentially of a yoke fitting over the base of the rail and held in place by a wedge. The yoke, with its abutting face on the same end that receives the wedge, has a lug on its large hook side. The under side of this lug is corrugated to form teeth sloping in the direction of the abutting tie. Directly beneath these teeth, but set one-half a tooth's width back, is a similar set of teeth which engage with corrugations on the wedge. The device can be applied very simply. The yoke portion is slipped over the base of the rail, bringing the abutting face up against the tie, and by giving the wedge a tap with any convenient tool the teeth on the wedge are meshed with those on the yoke, in which position the device will remain tight. It is claimed that the design of teeth on the yoke and both sides of the wedge gives an auto-



Q & C Anti-Rail Creeper.

matic tightening effect so that the wedge can tighten up and will never give back and that the greater the pressure brought to bear upon the yoke the tighter the anti-creeper grips the rail. As the abutting face bears upon the tie the ratchet teeth in the yoke slide over those on the wedge, tightening the device permanently and preventing its loosening when the train passes over and the rail rebounds. This device is being placed on the market by the Q & C Company, New York.

## FOREIGN RAILWAY NOTES.

The Russian committee on new railways has been considering projects for the construction of lines in the eastern part of Russia, notably that of the Troitzsk Railway Company, which seeks permission to construct under guarantee of the government a line from Orenburg through Orsk to Troitzsk, of a total length of 420 miles. The contractors wish to also form a share company for the construction of an Orenburg-Orsk railway 190 miles long. The committee is giving these lines full consideration.

The first section of the proposed Pan-American railway in Guatemala, between Las Cruces and Coatepeque, presents difficulties heretofore unencountered in the construction of railways in Guatemala, since, in the desire to locate the line as near as possible to the zone of production, it penetrates, in consequence, a territory, extremely broken, an adequate idea of which may be received from the fact that, in the first 20 miles, the excavation will exceed 2,500,000 cu. yds. The required bridges, in addition, are numerous. There are several bridges which will be 560 ft. long and 250 ft. high. Twelve of the 42 miles have been graded. Of the part which remains, eight miles run through very broken ground, necessitating deep excavations, where operations must necessarily proceed slowly because of the limited number of workmen which can be concentrated at any one point. Once arrived at Coatepeque, the condition of the ground undergoes a notable change, reducing greatly, in proportion, the amount of earth to be removed, and assuring for that section a rapid completion. Seven miles have been completed and opened to traffic; that part of the line between Las Cruces and San Miguelito. With the installation of three bridges, rails will be laid to Taltute or Santa Joauina, 12 miles. The extension to Agutla, on the Mexican frontier, is expected to be completed by July, 1913.

# Maintenance of Way Section.

OUR contest on The Foreman Problem—How to Provide a Supply for the Future, is arousing much interest. The problem is of such direct concern to maintenance men, and its importance is so fully realized by them that the contributions should be especially valuable. The railways that are not already facing this problem must face it soon, and the methods of solving it advocated by the men directly concerned with or engaged in track work should prove interesting to their superiors. Ten days still remain in which to send in contributions, and it is hoped that as many as possible will tell of their experience for the benefit of others. We will pay $25 for the best and $15 for the second best discussions of this subject, and all other contributions accepted and published will be paid for at our regular space rates. All contributions must reach the Civil Engineering Editor of the *Railway Age Gazette,* 417 South Dearborn street, Chicago, not later than March 25.

THE statements showing the remarkable savings effected by the Union Pacific and Chicago Great Western by the use of motor cars, which appear in this issue, are of such definite value in showing actual results on two important railways as to warrant careful study. That these savings are due to the use of cars and not because the track has been allowed to run down is evident to any one familiar with the roads, for on the contrary, the condition of the track has been gradually improved, especially on the Chicago Great Western. While the saving of $258 per mile per year on the Union Pacific is partially due to the combined track and signal maintenance, the larger part of it, it is believed, resulted from the use of the cars. The saving of $9,504.50 per month on the Great Western is at the rate of $76 per mile of main track per year.

TRACK men will soon be preparing for the heavier work to be done during the coming season, including rail relaying, ballasting, etc., and a discussion of the best methods of handling such work is timely. In most cases floating or extra gangs are used. The question frequently arises as to whether this is the most economical method. It is frequently the case that work is done with extra gangs which can be done to better advantage by increasing the regular section forces, and the reverse is also sometimes true. In planning for extra gang work it is necessary to consider the selection of suitable foremen as well as men. How should foremen, assistant foremen and timekeepers be provided? Is it best to put regular section foremen in charge of the gangs, or to hire outside foremen? If section foremen are used, does this tend to demoralize and break up the section organization? Also, are the foremen selected because of their experience with the class of men to be handled? Is an effort made to secure those laborers who are naturally suited because of their strength, racial characteristics, etc., for the work to be done, and are the gangs transferred from one class of work to another without considering these natural characteristics? What peculiarities and relative advantages do the different kinds of labor possess for the different classes of work? All of these questions and others suggest themselves to the roadmaster and supervisor when they are organizing their extra gang forces. The whole subject is an important one, in view of the large number of men employed and the amount of money expended each season. We desire to secure a full discussion of the extra gang problem and will pay $25 for the best and $15 for the second best papers submitted on this subject, while others accepted and published will be paid for at our regular space rates. All contributions must be in the hands of the Civil Engineering Editor of the *Railway Age Gazette,* 417 South Dearborn street, Chicago, not later than April 25.

CHICAGO will be the central point of interest for the engineering maintenance of way men of the United States, Canada and Mexico next week. The annual convention of the American Railway Engineering Association will be held on Tuesday, Wednesday and Thursday, while the spring meeting of the Railway Signal Association will be held on Monday. The annual exhibition of the Railway Appliances Association will be open all week at the Coliseum. Because of these important annual meetings the third week in March is becoming more firmly fixed each year in the minds of railway men as convention week. Greater interest is being taken from year to year, and the meetings are becoming more largely attended and more valuable. The Railway Appliances Association, which has been somewhat crowded for the past two years, has spread out this year into the First Regiment Armory, so that a larger space is available for exhibits. It is to the benefit of every one from chief engineer to supervisor and foreman to attend as many of the meetings of the American Railway Engineering Association as possible. A visit to the exhibit at the Coliseum is specially instructive, for there one has an opportunity to see and investigate practically all the leading track devices in use, as well as many new devices which are now being tried. For the benefit of those who cannot attend, as well as to provide those who do attend with a record of the meetings, the *Railway Age Gazette* will publish a daily edition during the conventions which will contain complete reports of the proceedings, including the discussions. This daily edition will be sent to all subscribers to the Maintenance edition, as well as to the regular weekly edition.

ON most roads it is the practice for the section forces to maintain the approaches to highway crossings and the highways themselves out to the right of way lines. Generally this practice has come to be regarded as a legal obligation, both by the railways and by the highway supervisors, and the supervisor promptly sends a notice and a demand to fix a crossing whenever he has any complaint to make. As the amount of travel, and especially of automobile travel, on the highways has increased, the work required to keep these crossings in proper condition has likewise become greater, until at present it is making serious inroads on the time of the track forces and the annual cost is a large sum. In many cases little thought has been given to the question of the railways' legal responsibility for the maintenance of those portions of the roads between their right of way lines. The legal department of one railway recently investigated this subject in Kansas, and advised that when a railway is constructed across a public highway after the highway has been laid out and dedicated to public use, it is the duty of the railway company to restore the road as nearly as practicable to its former condition and construct the necessary approaches to the railway track. If drains in the approaches are necessary the railway is required to maintain these drains. When a road is opened across the railway tracks it is not the duty of the railway company to construct the approaches or to put in and maintain the drains in these approaches, but the railway is simply required to properly plank the crossing. As a result of this advice, this railway has discontinued maintaining those portions of the highways beyond the ends of the ties. The Supreme Court of Iowa has ruled that a railway company must maintain the approaches to a crossing in that state. However, even here railways generally maintain to the right of way line, which, in most cases, is beyond the end of the approaches. The statutes and the court decisions on this subject vary in the different states, and in these days of strict legal interpretations, when the public in general is very careful to see that the railways comply with every detail of the law which works to the public's benefit, the railways might well in-

vestigate these different statutes, and, if it is found that they are maintaining more than they are required to do, place the burden where it legally belongs.

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A FROG and switch repair car, such as that used on the St. Louis & San Francisco, and described in the *Railway Age Gazette* of January 19, or that of the Southern Pacific described in this issue, should prove of equal value on other roads. On the lines mentioned a blacksmith travels over the road with the car repairing frogs, switches and other track material as he proceeds. This eliminates shipping such heavy material to the storehouse or shops for repairs, which is no small expense in itself. It also insures better workmanship, for the man who devotes his entire time to this matter is better prepared to handle it expeditiously and properly, and he will also do better work, for he will know that any defects will show up against him. The Frisco repair man advises the section foreman in advance when the car will be due at his station. The foreman arranges to have his men near at hand where they can be readily called in when the car arrives. All frogs, switches and other track material are carefully gone over and put into good condition before the car leaves. The blacksmith also repairs the workmen's tools and does any work that may be needed for the station master, such as repairing defective trucks, etc. When the car leaves the station all the tools are in good condition, having been tempered and sharpened. The moral effect of this plan on the track forces is very good, as it gets the men to watching their tools more carefully. Instead of throwing them away when they become worn they will carefully lay them aside until the repair man comes along. One of the older foremen was so pleased with the result of this plan that he dug up a lot of discarded tools and had them repaired. It would appear possible to extend this method to important lines on other roads where the traffic is heavy and frog and switch repairs are in proportion. A good place to try it out experimentally would be in yards or terminals where the number of frogs within a limited area is large and the car would be subject to few delays.

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### A RAILWAY LABOR BUREAU.

WHEN one considers the care with which material is purchased for use on a railway he is inclined to wonder at the apparent want of care in the selection of the large number of men who make up the bulk of the unskilled labor used in maintenance and construction work. Specifications for surplus are prepared to insure proper material and workmanship, and bids are asked from several manufacturers to secure competition. After the contract is let inspectors test the finished product before it is accepted. At every stage of the transaction the purchasing department tries to protect the interests of the road by getting the best material for the money. Furthermore, as all purchases are made through one department benefits are derived from the greater experience of the men in this department and from the combination of orders for different parts of the system.

When getting unskilled labor, especially for floating gangs, and also to an increasing degree for section work, such precautions are not taken. On most roads such labor is secured through labor agents, and the railway gives few, if any, instructions beyond the number of men required. On some roads this work is concentrated so that one representative of the company deals with the labor agents. On other roads each division officer conducts his own negotiations.

The wide range in efficiency of different nationalities in special lines of maintenance work, and of different men in the gang, many times is not considered, the assumption being that one man is as good as another. It might as well be assumed that a soft tie is as good as an oak tie, so it is a tie. Part of the decline in the quality of track labor is probably due to this attitude. Because men of the better class are paid no more than the poorest workman in the gang, and a fixed wage applies to the same work on all parts of the system, there is no incentive for an ambitious laborer to exert himself, and he goes into other trades where industry is rewarded by increased pay. This is largely because many railway men believe that all foreigners of the nationalities making up the bulk of track labor are incapable of anything but unskilled labor, whereas large numbers of them are to be found in the ranks of the building and other skilled trades.

The organization of a labor bureau, such as is advocated by Mr. Wollner in an article published elsewhere, would appear to have a number of advantages. It is true that the first result would be to increase the cost of operation by the amount expended for the organization of the bureau, but the results secured by the better selection and distribution of labor should much more than offset this. This increased first cost should not be allowed to blind the higher officers to the merits of the plan, for sometimes a small increase in salaries is a stumbling block which prevents important improvements from being made.

A railway having such a bureau could exercise control over the labor secured, which is not the case when roads deal with the labor agent. As his fee is received from the laborer the agent has an incentive to have each laborer come to him as often as possible. He will naturally encourage short service and frequent change, because his income is thereby increased. This fee system is demoralizing to the laborer, especially if he has but recently come to this country. In many cases the foreman, or more frequently the interpreter, levies further tribute by charging the men for allowing them to keep their jobs. Even strict supervision will not entirely eliminate this, and it seems impossible to stamp it out under the present organizations. In many cases an interpreter has such a strong hold on his men that he is able to take them wherever he goes. He bargains for their work as a unit, and the discharge of one means the quitting of the entire gang. Such gangs give much trouble, for it is very difficult to maintain any sort of discipline over them. Because of the demoralizing influence of many interpreters many roadmasters prefer to do without them.

There is much to be gained by a careful selection of the men for the special purposes for which they are desired. For laying rail or doing other heavy work native hoboes or Austrians are usually better than Italians or Greeks, because of their stronger physique. The reverse is true of ballasting work. For laying frogs and switches in yards hoboes are better than foreign labor, because of their greater intelligence and familiarity with the work. Again, where several gangs are concentrated on the same work excellent results are secured by hiring as far as possible gangs of different nationalities. By taking advantage of national rivalries the men may be spurred to increased efforts. A labor bureau should be able to distribute gangs so as to get the best results, a thing which is many times not now done because of a lack of such a central organization.

Another advantage of such a system would be the opportunity it would afford for the inspectors traveling over different parts of the systems to study the weaknesses and strong points of the different classes of men on different divisions. The fact that one division has obtained better results with one class of labor than another division has obtained with another class is not necessarily conclusive, for the difference may be due to differences in the methods adopted by the roadmasters or foremen in handling the men. Each class must be handled differently, and many foremen are unable to do so. By having the opportunity to study results on a number of divisions an inspector should be able to give valuable advice to the roadmasters and foremen, and, perhaps, to get a corps of foremen who could be used with the class of gangs in the handling of which they were most proficient.

Only one or two roads have experimented with the plan advocated by Mr. Wollner. The present year probably will offer a good opportunity for such experiments, for the present outlook is that the supply of labor will exceed the demand, making it possible to exercise more than usual care in seectling labor.

## EVOLUTION IN TRACK AND SIGNAL MAINTENANCE ON THE UNION PACIFIC.

BY A. M. FOOTE,

Chief Clerk, Maintenance Department, Nebraska Division, Union Pacific.

Although much progress has been made toward efficiency and economy in many railway departments that employ a large amount of labor, the organization of the maintenance of way department has long remained practically unchanged. There is no question but that considerable labor is duplicated in this department.

Following is an outline of an organization in force for the past two years on a portion of the Union Pacific, which may be of interest and use to others who are working toward improvements in maintenance operations. The three principal reasons for changing from the former organization of maintenance forces were:

(1) The loss of time in transporting men back and forth between section headquarters and the place of operation, when hand cars are used. By the hand-car method there is a loss of both time and energy. It cannot be expected that the gang which has "pumped" a slow-moving hand car against head winds will start the day's work on the track with very much vigor, nor will they show energy in the afternoon's work with a prospect of pumping a hand car several miles before arriving at home in the evening.

(2) The amount of time "killed" by laborers when left to themselves or when "pumping" the foreman over a section, as is necessary under the old organization, while the foreman is inspecting track. Nearly all trunk lines require foremen personally to inspect the track on their respective sections at least three times a week. A foreman must either take the entire gang with him or leave a number of the men to themselves while he is absent, which, in either event, results in practically nothing being accomplished by the gang during this inspection. This is especially true if foreign labor is used.

(3) The lack of sufficient force on any one section under the former method for successfully and economically handling heavy work. This is due to the allotment of men per section being small, as the length of the section is restricted by the use of hand cars, and the allowance of laborers on a district is made practically on a mileage basis. Main line sections on trunk lines usually average four to six miles of single track or three to five miles of double track. During the summer season, when the maximum force is employed, there are barely enough men in the section gang properly to line or surface track where heavy steel, hardwood ties, tie plates, and ballast are used. When the force is reduced, there are seldom enough men left to handle a full-length heavy section rail, to say nothing of lining track, and when any heavy work is to be done, it becomes necessary to combine two or three section gangs, some of them "pumping" hand cars six to nine miles. This plan results in no care of the track during the interim on the sections that have been robbed. The winter force on each section as a unit is of little use except to "pump" the foreman back and forth over his section, perhaps tightening a few bolts or tapping down a few spikes. There is not sufficient force properly to gage, spike, line or shim track.

The three principal difficulties above outlined have been overcome by the modernized organization which we have in effect on the western district of the Nebraska division. The district consists of approximately 95 miles of double-track main lines, fully protected by automatic block signals, and approximately 65 miles of single-track branch line, with no block signals.

The main line is divided into 11 sections. The first section consists of two and one-half miles of double main track and a large yard at the junction of the main line and branch. The remaining 10 sections are nine or nine and one-half miles in length, each with a total of 18 or 19 miles of track. On each of these sections there is a foreman in full charge of track and signals at a salary of $75 per month; an assistant foreman at a salary of $65 per month; and 12 to 15 laborers during the summer season and five to seven laborers during the winter months. On each of these sections, gasolene section motor cars are used, with push-car trailers, capable of transporting 15 to 20 men and a full consignment of tools. A hand-power velocipede is also provided for the use of each foreman in making track and signal inspection. The work on the entire district is under the direction of a roadmaster with an assistant roadmaster.

On the branch line there are three sections of 16 miles and one section of 17 miles. Gasolene section motor cars are used. A foreman and six or eight men are employed during the summer season, and two men during the winter on each section, and the track is maintained in better condition and at less expense than was formerly the case with eight eight-mile sections.

The automatic block signals are of the semaphore type, made by the Union Switch & Signal Company, and installed by the railway company's forces. It formerly required, for the automatic signal maintenance, seven signal maintainers at salaries of $75 per month, each using a small gasolene motor car and covering a territory of approximately 13½ miles. These maintainers were in charge of an assistant signal supervisor, and under the general supervision of the signal supervisor.

This organization required the maintainers to cover their respective territories daily, taking care of the signal apparatus. They frequently called upon the section foreman for the necessary assistance in making repairs to insulated track joints, and there was constant friction between the signalmen and track men as to the care of bond wires, the adjustments of switches, repairs to joints, etc. In addition, the roadmaster, of course, required each section foreman to inspect the entire track on his section at least three times a week during stormy or severe weather, and track walkers were used to insure that the track was thoroughly inspected daily.

It was observed, however, that one man could cover the track daily, inspect it carefully, make what minor repairs were usually required of a track walker, and also give the necessary attention to bond wires, signal lamps, batteries, and other apparatus—in other words, that one man could easily perform the duties of both signal maintainer and track walker. This was then tried by entrusting the work of a track walker to the signal maintainer, but, as the maintainers were not responsible to the section foremen or the roadmaster, it was found very unsatisfactory.

When the modernized organization was put into effect, all of the signal work was placed under the supervision of the roadmaster, and the former assistant signal supervisor was appointed assistant roadmaster. The few signal maintainers who cared to remain under the revised organization were made section foremen or assistant foremen, an experienced track man being placed on the same section either as foreman or assistant, as the case might be, care being taken to have a competent track man and signalman on each section. The section foreman has since been made responsible for the maintenance of track and signals on his section. Each morning either the foreman or assistant foreman takes the gang and tools, with a section motor car, to the point of operation on the section and remains with the gang the entire day in direct supervision of track maintenance. The other foreman, with the use of a hand-power velocipede car, takes the necessary tools and supplies for the signal repairs and for light track repairs, proceeds over the section inspecting the track carefully, repairing bond wires, batteries, etc., filling signal lamps, oiling and adjusting signal apparatus, replacing or tightening bolts, inspecting frogs and switches; in fact, doing all work formerly performed by both signal maintainer and track inspectors. He makes note of any bad spot in the track which requires the service of the gang, and reports the condition when he returns at night, or when he meets the foreman and gang on his return to the section headquarters. If conditions are such as to require immediate attention, he re-

turns to the gang at once and procures the necessary assistance.

Experience has taught us that a thorough inspection of track conditions and signal apparatus cannot be made by the use of motor cars. No matter how conscientious the inspector may be, he will unconsciously, if not intentionally, travel over his section at a rate of speed that will not permit of proper inspection. Therefore, we consider it advisable to equip each section with a hand-power velocipede for use in making daily inspections. This has resulted in considerable saving in the difference in cost of the two types of cars, and at the same time has secured a more perfect inspection, and consequent higher efficiency in track and signal maintenance.

We find that this organization overcomes the three principal difficulties previously mentioned, namely:

(1) Gangs are transferred to or from any point on a nine and one-half mile section in 30 or 40 minutes.

(2) The men are under the constant supervision of a foreman.

(3) There are a sufficient number of men on each section at any time properly to handle any ordinary track or signal repairs.

In general, we get more frequent and more careful inspections of track and block signals, and both are maintained in as good condition as under the former separate organization with as few avoidable signal failures, and at a greatly reduced labor expense. There is now no friction between the men of different organizations, as there is but one organization, and the foreman on each section reigns supreme. Some difficulty, quite naturally, was experienced at first with the signal work until the men had been sufficiently instructed and had gained experience, but this has long since become history.

We believe the organization can be further improved; and though it might not be adaptable to all conditions, it has certainly proved successful on the western district of the Nebraska division. We have attained a higher state of efficiency and maintained the high standard for which the Union Pacific has a world-wide reputation, very much more economically than by the former organization. This is shown by the following comparative statements:

COMPARATIVE STATEMENT OF BLOCK SIGNAL FAILURES FOR SIX MONTHS, ENDING NOVEMBER 30, 1911.

| | Failures of Practically Same Mileage on Different Districts. | | | |
|---|---|---|---|---|
| | Separate Organization, 307 Signals. | | Combined Organization, 357 Signals. | |
| Description of Failure. | Avoidable. | Unavoidable. | Avoidable. | Unavoidable. |
| Broken bootleg wires | .. | 1 | .. | 2 |
| Relays damaged by lightning | .. | 7 | .. | 10 |
| Defective relays | .. | 1 | .. | 1 |
| Broken wires on slot coil | .. | 2 | .. | 4 |
| Broken wires in battery chute | .. | 0 | .. | 1 |
| Broken wires on terminal board back of buffer | .. | 1 | .. | 0 |
| Defective lightning arrester | .. | 1 | .. | 0 |
| Broken bond wires | 4 | .. | 2 | .. |
| Loose connections | 0 | .. | 3 | .. |
| Weak track battery | 0 | .. | 2 | .. |
| Defective insulated joints | 0 | .. | 1 | .. |
| Improper connection on track battery | 1 | .. | 0 | .. |
| Totals | 5 | 13 | 8 | 18 |

COMPARATIVE STATEMENT OF AVERAGE MONTHLY COST PER BLOCK SIGNAL OF MAINTENANCE AND OPERATION.

| | Average cost of practically same mileage on different districts. | | | |
|---|---|---|---|---|
| | Separate Organization. | | Combined Organization. | |
| Character of Work. | Per Signal. | Total. | Per Signal. | Total. |
| Maintenance | $ .53 7/10 | $164.84 | $ .70½ | $251.69 |
| Operation | 1.85 3/10 | 568.73 | 1.17½ | 419.47 |
| Total | $2.39 | $733.57 | $1.88 | $671.16 |
| Separate organization, average cost per month, per signal | | | | $2.39 |
| Consolidated organization, average cost per month, per signal | | | | 1.88 |
| Average saving per month, per signal | | | | $ .51 |

MONTHLY COMPARISON OF COST OF SEPARATE AND CONSOLIDATED ORGANIZATIONS—MAIN LINE, WESTERN DISTRICT.

| Separate Organization without Motor Cars. | | Consolidated Organization with Motor Cars. | |
|---|---|---|---|
| Force. | Cost per Month. | Force. | Cost per Month. |
| 1 Roadmaster | $140.00 | 1 Roadmaster | $140.00 |
| 1 Assistant Signal Supervisor | 110.00 | 1 Asst. Roadmaster | 110.00 |
| 24 Foremen | 1,465.00 | 11 Foremen | 825.00 |
| 7 Maintainers | 525.00 | 11 Asst. Foremen | 715.00 |
| Total | $2,240.00 | Total | $1,790.00 |

| | |
|---|---|
| Separate organization, cost per month for supervision | $2,240.00 |
| Consolidated organization, cost per month for supervision | 1,790.00 |
| Saving per month on supervision | $450.00 |
| Saving per month on reduction in number of laborers, account use of motor cars | 624.00 |
| Total saving per month account reduction in force | $1,074.00 |
| Total saving per year account reduction in force | $12,888.00 |

STATEMENT OF COST OF MAINTAINING TRACK AND SIGNALS, MAIN LINE, WESTERN DISTRICT, UNDER SEPARATE ORGANIZATION, AS COMPARED WITH COST OF MAINTAINING SAME TERRITORY BY COMBINED ORGANIZATION.

| | | | |
|---|---|---|---|
| Supervising Force—Separate Organization: | | | |
| 1 Roadmaster | $140.00 | | |
| 1 Asst. Signal Supervisor | 110.00 | | |
| 24 Section Foremen | 1,465.00 | | |
| 7 Signal Maintainers | 525.00 | | |
| Total | | $2,240.00 | |
| Supervising Force—Combined Organization: | | | |
| 1 Roadmaster | $140.00 | | |
| 1 Asst. Roadmaster | 110.00 | | |
| 11 Section Foremen | 825.00 | | |
| 11 Asst. Section Foremen | 715.00 | | |
| Total | | $1,790.00 | |
| Saving per month on supervision | | | $450.00 |
| Saving per month on reduction in number of laborers, account using motor cars | | $624.00 | |
| Saving per month in time going to and from work, account of motor cars | | *707.72 | |
| Saving per month in time of laborers, account combined organization leaving foremen in charge, while other foreman is inspecting track and signals | | 353.93 | |
| Total saving per month on laborers' time | | | $1,685.65 |
| Total saving per month on labor | | | $2,135.65 |
| Total saving per year on labor | | | $25,627.80 |
| Cost of additional buildings that would have been required by separate organization | | $17,754.00 | |
| Less cost of additional buildings required to take care of combined organization | | 4,916.00 | |
| | | $12,838.00 | |
| Expense of moving buildings to suitable locations and repairing same, account combined organization | | 4,697.00 | |
| Net saving on permanent investment in buildings | | $8,141.00 | |
| Interest at 4 per cent. per annum on net saving in permanent investment | | | 325.64 |
| Saving on investment in 24 hand cars that would have been required under separate organization | | $648.00 | |
| Saving on investment on seven two-man motor cars for signal maintainers | | 945.00 | |
| Total saving on cars | | $1,593.00 | |
| Interest at 4 per cent. per annum on value of cars | | $63.72 | |
| Annual saving on hand and two-man motor cars. | | | $63.72 |
| Total gross saving per year | | | $26,017.16 |
| Invested account combined organization: | | | |
| For 11 section motor cars | $3,850.00 | | |
| Interest at 4 per cent. per annum on above investment | $154.00 | | |
| Cost per year maintaining above cars | 440.00 | | |
| Cost per year to operate 11 section motor cars: | | | |
| Gasoline oil | $660.00 | | |
| Lubricating oil | 192.00 | | |
| Waste | 30.00 | | |
| Total cost of operation | | $882.00 | |
| Total per year for investment, maintenance and operation | | $1,476.00 | |
| For 11 two-man hand power velocipedes | $302.50 | | |
| Interest at 4 per cent. per annum on investment | $12.10 | | |
| Cost for oil and general maintenance | 24.20 | | |
| | | $36.30 | |
| Total expense per year for equipment, account combined organization | | | $1,512.30 |

*Figures closely estimated; no positive data at hand at this time.

| | |
|---|---|
| Total expense per year for equipment, account combined organization (brought forward) | $1,512.30 |
| Total net saving per year on main line, account combined organization | $24,504.86 |
| Total net saving per year, per mile of double main track and block signal equipment for maintenance and operation | $258.00 |

MONTHLY COMPARISON OF COST OF ORGANIZATION EQUIPPED WITH HAND AND SECTION MOTOR CARS—BRANCH LINE, WESTERN DISTRICT.

| Hand Car Organization. Force. | Cost per Month. | Motor Car Organization. Force. | Cost per Month. |
|---|---|---|---|
| 1 Roadmaster | * | 1 Roadmaster | * |
| 8 Section Foremen | $480.00 | 4 Section Foremen | $250.00 |
| Organization with hand cars, cost per month for supervision | | | $480.00 |
| Organization with motor cars, cost per month for supervision | | | 250.00 |
| Saving per month on supervision | | | $230.00 |
| Saving per month on reduction in laborers, account use of motor cars | | | 195.00 |
| Total saving per month, account reduction in force | | | $425.00 |
| Total saving per year, account reduction in force | | | $5,100.00 |

STATEMENT OF COST OF MAINTAINING TRACK, BRANCH LINE, WESTERN DISTRICT, UNDER HAND CAR ORGANIZATION, AS COMPARED WITH COST OF MAINTAINING SAME TERRITORY BY MOTOR CAR ORGANIZATION.

| Supervising Force—Hand Car Organization. | | Supervising Force—Motor Car Organization. | |
|---|---|---|---|
| 1 Roadmaster | * | 1 Roadmaster | * |
| 8 Section Foremen | $480.00 | 4 Section Foremen | $250.00 |
| Saving per month on supervision | | | $230.00 |
| Saving per month on reduction in number of laborers, account using motor cars | $195.00 | | |
| Saving in time going to and from work, account use of motor cars | 140.46† | | |
| Total saving per month in laborers' time | | | $335.46 |
| Total saving per month on labor | | | $565.46 |
| Total saving per year on labor | | | $6,785.52 |
| Saving on investment in eight hand cars required by the hand-car organization | $216.00 | | |
| Interest at four per cent. per annum on value of cars. | $8.64 | | |
| Annual saving on investment | | | 8.64 |
| Total saving per year | | | $6,794.16 |
| Invested account motor car organization: | | | |
| For four section motor cars | $1,400.00 | | |
| Interest 4 per cent. per annum on value motor cars. | $56.00 | | |
| Cost per year maintaining above cars | 160.00 | | |
| Cost per year to operate four section motor cars: | | | |
| Gasoline oil | $240.00 | | |
| Lubricating oil | 69.80 | | |
| Waste | 11.00 | | |
| Total cost of operation | $320.80 | | |
| Total cost per year for investment, maintenance and operation | $536.80 | | |
| Total expense per year, for equipment, motor car organization | | | $536.80 |
| Total net saving per year, branch line, account motor car organization (see Note) | | | $6,257.36 |
| Total net saving per year, per mile, of single branch line track, for maintenance | | | $96.26 |

*Roadmasters' salary all shown on Main Line.
†Figures closely estimated; no positive data at hand at this time.
[Note.—Section buildings not taken into consideration in the compilation of this data, as we had no buildings under the hand car organization, neither have we now under the motor car organization. However, a further saving can be shown, as only four complete sets of section buildings would be required by the motor car organization, while the hand car organization would call for eight complete sets.]

SUMMARY.

| | Per Year. | Per Mile. |
|---|---|---|
| Total net saving, Single Branch Line | $6,257.36 | $96.26 |
| Total net saving, Double Main Line | 24,504.86 | 258.00 |
| Total net saving on District | $30,762.22 | |

The officers of the American Wood Preservers' Association have adopted a plan this year of indexing all articles pertaining to timber preservation which appear in the technical papers, and sending copies of this index monthly to all members of the association.

## THE CEMENT GUN.

The use of a device known as the cement gun for placing cement in various ways not previously considered practicable has recently attracted considerable attention. While formerly thin layers of cement could be deposited only by means of slow and expensive methods either by plastering or by the building of forms, the same result is secured with great rapidity and in some cases at even a lower cost with the cement gun. The advantages of this machine and a complete discussion of the character of the cement deposited by it were presented in a paper read by William A. Jordan before the American Society of Engineering Contractors at the society's regular meeting November 14, 1911. The following details are abstracted from this paper.

The apparatus was invented by C. F. Akeley, a taxidermist of Chicago, who was connected with the Field Museum committee in charge of remodeling and preserving the World's Fair building in Jackson Park used for that museum. The coating of this

**Cement Gun Apparatus.**

building with stucco was the first commercial use of the new apparatus, the work being performed rapidly and successfully.

The cement gun consists essentially of a hopper in which the materials are placed, a hose connected to the bottom of the hopper through which a dry mixture of cement and sand is forced by compressed air, and a specially constructed nozzle at the end of the hose to which is attached another hose supplying water for hydrating the material. The hopper holds about 3 cu. ft., its capacity ranging from 10½ to 28 tons of material in eight hours. The materials are mixed dry either by hand of by a machine before they are placed in the hopper. In large operations it is usually economical to use a mixer for this purpose. The material must be thoroughly screened and mixed to prevent the choking of the feed wheel by foreign matter. Ordinary laborers can be used for supplying the material to the hopper, but the man at the nozzle must be experienced. The hose is of an extra quality of rubber and has been found to last from four to six months. Metal hose has been tried but does not give as long a life as a good grade of rubber. Metal nozzles are worn out very rapidly by the action of the sand in the blast. On this account they are lined with rubber of a special grade which has

so far proved to be the cheapest and most serviceable material for protecting the metal. The apparatus is designed to handle aggregates as coarse as buckwheat or limestone screenings for making a pebble dash finish. The design could be altered to use larger aggregate, but so far it has not been necessary. For some classes of work hydrated lime is mixed with the cement. A mixture composed of 85 per cent. cement and 15 per cent. hydrated lime has been found very satisfactory, as the lime diminishes the number of voids in the material, tending to waterproof it, and apparently the mixture goes through the gun better, "lubricating" the mechanism. The nozzle velocity corresponds to an air pressure of 35 lbs. per sq. in.

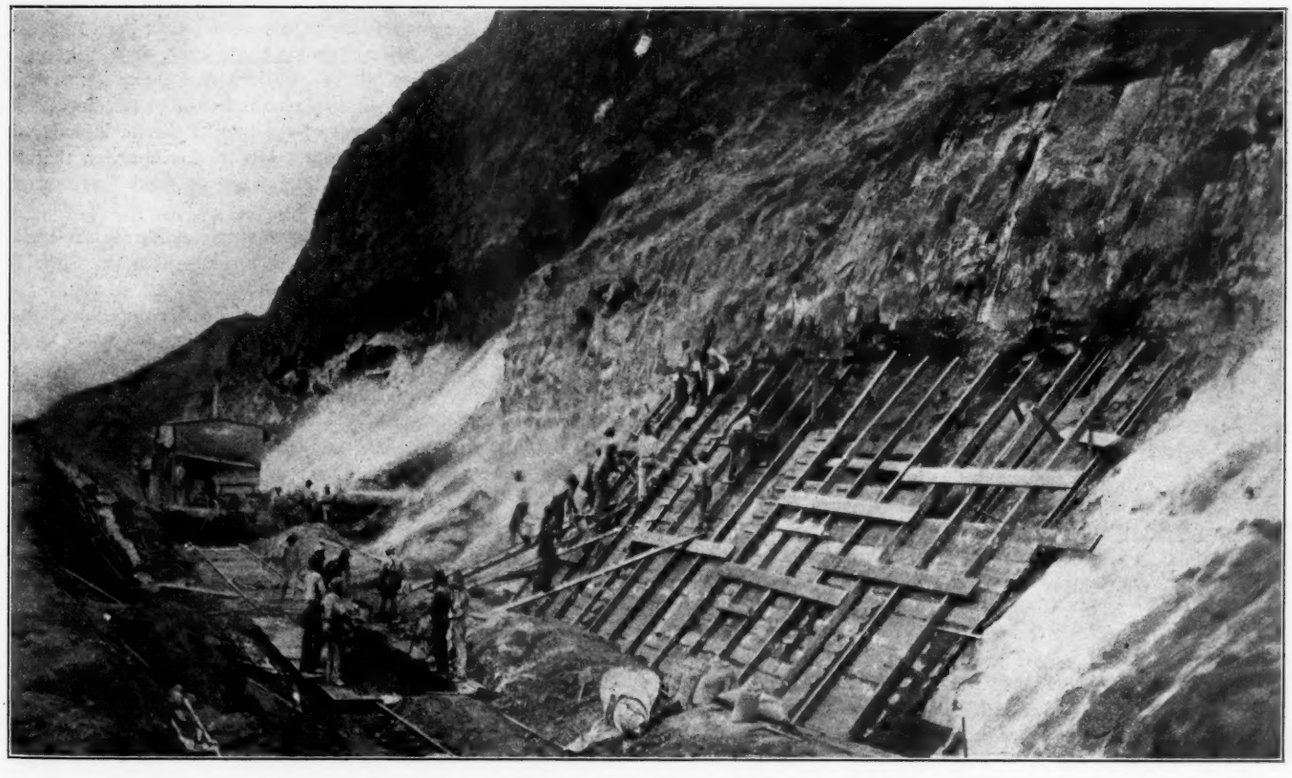
The action of depositing concrete by this process can be best explained by considering the action of the ordinary sand blast. In that apparatus a powerful current of air is allowed to escape from a nozzle, a quantity of sharp, clean sand being introduced into the stream at some point back of the nozzle. The velocity of the air imparts a high velocity to the particles of sand, the force exerted by their momentum being sufficient to wear away hard substances, such as iron castings, stone, etc. If a sand blast were directed against a surface of comparatively soft and sticky nature, such as ordinary wax, the particles of sand, instead of wearing the wax away, would penetrate the surface and become a part of the mass. This process would continue until the wax contained so much sand that the sand itself would resist the force of the blast, and the particles striking it would be thrown off. If, however, a proportion of powdered wax were introduced into the sand blast and the combined material directed against a hard surface the first particles of sand striking the surface would bounce off, but the particles of wax being soft and sticky would adhere until a thin coating of wax had been formed over the surface. When this coating had become thick enough some of the particles of sand would begin to penetrate it and remain in the wax. The process would then continue building up wax and sand in a solid mass. This is the action which occurs in the use of the cement gun. Tests of cement deposited in this way show that there is a layer of practically neat cement formed at the junction with the old surface, and on it is built up the mass of perfectly proportioned cement.

The process of depositing cement in this manner insures certain properties for the mass which are difficult to obtain in material mixed either by hand or machine. It is well understood that to obtain the maximum strength in concrete no excess water should be used above that needed for hydration of the cement, but in practice cement mixed with the theoretical amount of water is so dry as to be extremely hard to place. In the case of cement placed with the gun, any excess water which may be introduced at the nozzle is forced to the surface of the layer of cement, which is being formed by the impact of the stream, and runs away. The action is the same as that in ramming or tamping concrete which is deposited in place. This action also accounts for the fact that gun-placed cement has fewer voids than mixed cement. The proportioning is more nearly perfect than can be obtained by mixing, since the action of depositing depends upon the proper mixing of the adhesive particles of cement and the particles of sand, as was explained in connection with the sand blast. A series of tests conducted by Westinghouse, Church, Kerr & Company showed that the tensile strength of gum-made cement excelled hand-mixed cement in every case by amounts ranging from 20 to 26 per cent. The compressive strength of the gun product was even more marked, ranging from 20 to 72 per cent. better than hand work. The gun-placed cement absorbed from 5 to 70 per cent. as much water per hour per unit of area as similar hand-made surfaces. The hand-made mortars absorbed from 1.4 to 5.3 times as much water as gun-made mortars. The percentage of voids in the gun made product ranged from 52 to 75 per cent. of that in the hand-made products. The adhesion of gun-applied mortars averaged 27 per cent. better than that of hand work.

**Sea Wall at Lynn, Mass., After Being Repaired with a Cement Gun.**

The cement gun has been used for a number of widely different purposes, probably its best known application being that on the Panama Canal work. The excavation in Culebra cut exposed a fine grained clay rock which was moderately hard when first exposed but crumbled after a short exposure to the air. This surface disintegration was a very serious matter as it undermined the overlying strata and produced serious overhanging of the heavy rock above. To protect this rock from disintegration it was first thought necessary to build a flat wall through the cut. The engineers in charge planned to reinforce this wall with old French rails and some sections of the wall were built, varying in thickness from 4 in. to 4 ft. The cement gun was later used for this work, the surface of the rock being coated with a layer of cement about 2 in. thick which served the same purpose as the heavier walls and could be placed at a

Cement Gun in Use in Bergen Hill Cut on Central Railroad of New Jersey.



Cement Gun in Use on the Panama Canal.

great saving in cost. The gun was mounted on a flat car, carrying materials sufficient for one day's work and was operated by five men.

The New York Central & Hudson River has used the cement gun process for coating the steel work in its new terminal in New York City. This work was done without forms or centering, the coating being from 2 to 3 in. thick. On account of the vibration of trains the coating was reinforced with wire mesh. In this case the cement gun process was very economical since no forms had to be used, and, in fact, it would have been practically inpossible to set up forms around some of the structural members. The steel work was first given three coats of paint and the reinforcing wire was depended on to hold the cement in place and secure it against vibration. It is very important in applying the cement gun process to steel that the surface be free of rust and perfectly clean.

The process is well adapted to repair work on bridge piers. The best example of this class of work is that done on a pier of the Dover Street bridge in Boston which had been seriously disintegrated by the action of the sea water. In this case it was necessary to contend with tides, and it was found that after

**Coating Steel Work in Grand Central Terminal, New York.**

the work had been placed from three to four hours it was unaffected by the rise of the water. In experimental work a hose had been turned on cement gun work after it had set for 2½ hours without seriously affecting the quality of the product. As an experiment, the nozzle of the gun was held under water and dry cement and sand forced out through the sea water, a very good grade of cement being thus formed. This method was not used in repairing the pier, but was simply a trial to show that cement may be built up in this way.

This process will no doubt find application in numerous other forms of construction, particularly for placing the crowns of arches, tunnels, and sewer inverts. It is often a difficult matter to place the section over the top of such arches, especially when the concrete is heavily reinforced. By the use of the gun process it should be possible to deposit cement rapidly in such places.

There is insufficient data available to determine accurately the cost of work placed by the gun process, the best figures being those obtained from the work on the Panama Canal. In this case the cost of labor and material alone was 50 cents per square yard of surface covered, while the corresponding cost of protecting a square yard by the concrete wall was $3.89. The data obtained in other classes of work indicate that the cost is at least no higher than that of hand work, and for some applications to which the process is best adapted the cost should be materially reduced. It has been quite widely applied to stucco work on houses, where it has been found that a coat of stucco can be applied for about the cost of two coats of paint. New houses have been built at a cost below the best hand work, the resulting material being better in quality than hand work.

## ORGANIZATION FOR THE SEASON'S MAINTENANCE WORK.

The economical and efficient prosecution of maintenance work depends very largely on the thoroughness of the organization of the forces and the care with which the season's duties are planned in advance. There is a particular part of the season in which each of the various maintenance operations can best be done; and if either is delayed, this will throw later operations out of their proper time and derange the schedule for the entire season with a resulting loss in effectiveness.

Much of the work of track and bridge forces is dependent on authority from the higher officers, and the responsibility for a late start often rests with them. Allotments of rail and ballast should be made early in the year, and the roadmaster notified where the material is to be used, so that he will not do anything which may have to be undone later. Bridgemen, likewise, should know early in the season what bridges will be renewed, so that they will make only necessary repairs. Heavy improvements, such as construction of second track or terminal yards, are best authorized early for the same reason. Instances are not unknown where a track has been ballasted early in the year, and later the construction of a second track or other heavy improvement has been authorized, with the result that the ballast on the original track has been spoiled by the grading for adjacent tracks.

It is the custom on many roads to prepare a budget about the first of the year on which is listed the work which the various departments desire to do during the year, together with the estimated costs. Theoretically, this budget includes only what the different officers believe it advisable to do, in view of the business outlook and other influencing conditions. Practically, on many roads the budget has degenerated into a list comprising all work which the various officers think there is a slight possibility of securing approval for, and including many items which they would not authorize if in control, and held responsible for expenditures. To be most useful the budget should include only that work which it is most advisable to do in order that the higher officers may distribute the money allotted for improvements to the best advantage.

It is of great advantage to secure definite action on the budget early in the year, so that work may start promptly when the frost leaves the ground rather than be delayed until May or June, awaiting authority to proceed, as is often the case. While the railways, and especially the less prosperous western roads, must closely reflect general business conditions in their expenditures, it seems unwise in many instances for these expenditures to fluctuate with business as closely as they do. It is very expensive to delay maintenance or construction until the early part of the summer while the officers are determining how business is going to be. This involves losing a month or two at the best end of the season, and necessitates carrying the work into the following winter as a result. The average railway executive is able to estimate closely enough what his road can undertake before frost leaves the ground. A very expensive form of economy commonly practiced is to postpone all the maintenance and improvements possible from year to year until after July 1 in order to include them in the account for the new fiscal year, and make a good paper showing in the expiring year. The certain result of such a system is to greatly increase expenses.

Given an early outline of what is to be done on their division, the responsibility for its successful prosecution rests largely

on the thoroughness of the organization of the roadmaster and bridge supervisor. They should arrange so that each step will be taken at the most favorable time and in accordance with the programme outlined for the entire season. The reason why one man regularly appears to have little to do while his neighbor is always badly rushed, although perhaps having less on his programme, often is that the former has eliminated all false motions, every piece of work fitting into his general plan. The duty of the roadmaster in this regard is especially important, and it is here that he can secure his best results. The section foremen likewise should know in detail what is to be done on their respective sections, and should be encouraged to plan in some manner for it. If the roadmaster can get them sufficiently interested to plan the work on their sections and then to endeavor to follow their schedules, he can unload much of his responsibility on their shoulders, and at the same time secure better results.

At this season the section foreman should be making every preparation to enter on his spring work. During the winter months he has had to watch his track gradually go down, but with the approach of spring he can begin to bring it back to proper standards. The roadmaster often has to caution new foremen about picking up low spots or bringing the low side of the track to level before the frost is entirely out of the ballast and subgrade. Shimming needs to be looked after carefully and the shims changed as the frost leaves the ground. Drainage is an important matter at this time of the year. The effects of poor drainage are especially evident where a large amount of snow has been on the ground, as has been the case in many parts of the country this winter, and leaves with a heavy rain.

After careful study of track conditions during the winter the roadmaster will find it profitable to go over each section with the foreman and coach him in detail regarding the work of most importance. Although the practice on some roads is to renew ties with extra gangs, many maintenance officers do not look on this with favor, and the handling of tie renewals by the regular section forces is more general. For single tie renewals the spring offers the most advantages to the track man. The ballast is loose and mellow, and the weather cool enough to allow the men to work to the best purpose. In order to take advantage of these conditions and to avoid delay when the weather is favorable, the ties should be distributed at an early date when the men cannot do other things. Unless this is done about one-fourth of the available working time is lost in trucking ties to the places where they are required. With proper arrangements it is usually possible to have the distribution made before the renewal work starts. Where the supply of ties has been stored in yards along the track, especially on branches or less important main lines, a good way to distribute them is to furnish a few flat cars at these stations. The section forces can then load and unload the ties where wanted by way-freight. As a car of ties can be unloaded in ten to fifteen minutes this causes but little delay to trains. The empty cars can be set out at the next station where they can again be loaded and unloaded by the way-freight on its return trip. After the ties have been put in track, which is usually the heaviest part of the section foreman's work, the regular work can proceed. There is plenty of time for the ties to become settled by the spring and the early summer rains, thus making it possible to level up and surface the track in good condition during dry weather. In fact, in this way the track can be kept in good riding condition and the customary mowing of the right of way, weeding, etc., done at the proper time, giving opportunity to clean the ditches, prepare fences, and do in the fall other work preparatory for the winter. Many roadmasters have found it advantageous to make a definite schedule for their foremen, showing the number of ties to be put in each month, thus giving them a definite figure to work to. An occasional meeting of the foremen on the division to discuss their work and compare notes on its progress will also prove advantageous.

Heavy work, such as ballasting, laying rail or widening banks, should be done by extra gangs, the kind of laborers used depending on the locality and the nature of the work. The foremen for these gangs can usually best be selected from the regular section foremen, care being taken to pick those well fitted to handle the class of laborers under their charge. However, where extensive work is done it is frequently better, when possible to do so, to hire outside experienced foremen rather than take good foremen away from sections which are difficult to handle for any length of time. It is best that the kind and quality of work to be done be well understood by the foremen before it starts, as it is often hard to get even fair results from these gangs unless great care is used. Their degree of efficiency depends largely on the foremen, who should see that no bad ties are left in the track when ballasting, that track is properly gaged and that ties are spaced as exactly as possible. Only close supervision of even these matters which seem simple will get the best results.

When possible to do so it will be advantageous to divide such work as surfacing and ballasting, so that the foremen will exert themselves not only because of a desire to do more than their neighbors, but also because they know that their work will be checked. The best results will be obtained if the roadmaster points out the little details that are neglected or that are well done. For instance, while adzing of ties is a small detail, it is one which is very hard to get done well; but it can be done by the average foreman if he will but devote himself to it.

It has been found that small jobs of bank widening which can be done economically by hand can in some cases be done most easily and cheaply with foreigners. The average hobo does not like this kind of work, and will not do as much per day as an Italian or Greek. A good way to handle it is to give each man a certain distance to cover, which will amount to one-half a day's work. With proper supervision one-third more can be got done in this way than in any other. The men like it best, and do not waste much time talking. The same method has been used with good succeess in mowing right of way with foreign laborers.

On several roads increased attention has been given in the past few years to systematic handling of maintenance work. Prominent among these is the Erie, which has worked out a definite programme which is followed from year to year. Late in the summer a division engineer accompanied by a master carpenter inspects all structures and reports on the work to be done in this department during the coming year. Similar inspections and reports are made on the track as soon as the frost is out of the ground. The season's work, with these reports as a guide, is laid out in the office of the engineer maintenance of way, and a definite programme arranged giving the time in which the different kinds of work should be done. It is required that the various items be completed at or before the time provided in the schedule. The division engineers send daily reports to the engineer maintenance of way, advising him of progress on the different jobs. This programme is also used as a guide for the shipping of material, which is found to eliminate many of the usual delays due to waiting for supplies. Late in the fall an inspection trip is made by the engineer maintenance of way with the division engineer, supervisors and foremen, on which the handling of the past season's work is discussed and improvements are suggested for the following year.

Such an organization for maintenance of way work, from the higher officers down to and including the individual foremen, should lead to decided economies. The possibilities for improvements by these means in the performance of duties of the roadmasters and bridge supervisors are especially great.

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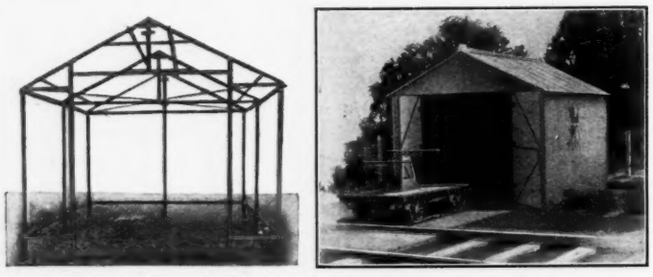
A railway from Booyong, New South Wales, to Ballina is proposed. This line will be 12 miles long, and it is estimated that it would cost $503,575. It is argued that the construction of this line be deferred until the North Coast has been completed.

## PORTABLE STEEL BUILDINGS FOR MAINTENANCE FORCES.

The recent development in the use of steel in the construction of small buildings, such as hand car houses, oil houses, cement and other storage houses and bunk houses for construction and maintenance crews is of much interest. This type of construction provides buildings which ahe portable and at the same time substantial and fireproof. They are designed on the truss principle, the frame being formed of adequate steel angles which are bolted together at the connecting points with galvanized steel bolts and plates. To insure rigidity, truss rods with turnbuckle adjustments extend diagonally from corner to corner of the building, guarding against twisting or sagging of the building and roof under strong wind pressure or a heavy snow load. The buildings are provided with strong steel doors constructed on steel angle frames, and steel-framed windows of heavy ribbed glass run in fine wire mesh of approved fireproof material. Similar sectional parts of the frame are interchangeable, and each part is numbered to correspond with a blueprint of instructions furnished with each building as it is shipped from the factory.

The wall and roof enclosures consist of galvanized sheets made in panels on angle iron frames and unite in weather-tight joints on the tongue-and-groove principle, very similar to wooden construction. These sections or panels are made in 28-in.



**Adaptation of Steel Building for Section House.**

widths and are attached vertically to the steel frame of the building by an ingenious application of the tongue-and-groove principle without nails, rivets or screws. The general simplicity and mechanical completeness of the entire plan of construction, as well as the durability and slightly appearance of the finished building are important points in its favor.

This type would seem to be an excellent form of construction for section houses, as shown in the accompanying illustration. Being portable, a crated building can be shipped complete to any point where it is wanted, unloaded at the desired location and erected in a few hours by the section crew. A very little paint will cover the house to harmonize with other buildings of the road. Buildings of larger capacity are well adapted for bunk houses for construction crews as they are absolutely sanitary, and they are also suitable for storage houses in which to keep materials and supplies. When it is desired to move a crew from one location to another, these buildings can be taken down in the same sectional parts without waste or loss of any of the original material and readily moved to the location of the next job at small expense.

This plan of construction will very probably come into extensive use as it is brought to the attention of the proper officials. Already some important electric railways have it under advisement and are taking advantage of its low lost as compared with other forms of buildings as well as its low cost of maintenance.

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On the question of new Russian railways, the second department of the imperial council is considering in conjunction with the ministers of finance and ways of communication the formation of the Altai Railway Company, which is to run a line from Novo-Nikolaievsk to Barnaul and Semipalatinsk, with branch to Bisk.

## PLAN OF ORGANIZATION FOR A RAILWAY TRACK LABOR DEPARTMENT.*

BY WILLIAM S. WOLLNER.

The system of hiring all semi-skilled and common labor for maintenance of way and construction work through employment offices having no connection with the railway company is practically uniform on all roads operating through the western portion of the United States, and it is partially due to this system that the railways have become burdened with the inefficient labor that now works on the right of way throughout the west. As the labor agent receives a fee only from the men he hires it is needless to say that he takes the bad with the good; in fact, the ability of the man has nothing to do with whether he shall be hired or not. This lowers the average efficiency of the labor employed, thereby increasing the cost of the work performed. The present system of employing labor can be compared with the impossible situation of a company placing the purchasing of its supplies in the hands of a man who receives no compensation from it, but receives a commission from the sellers for all goods bought by him, the railway accepting all goods without inspection or test.

It is common knowledge among those who handle labor that some men will do twice or three times as much work as others, and that while certain classes of labor are suited to one kind of work, they are entirely unsuited to any other kind. Still the employment agents will engage any man who may be seeking a job, and the railway, in most cases, accepts any man offered to them by the employment offices.

Another bad feature of the present system is the method of handling transportation for laborers. At present, the labor agent frequently gets a pass for the men he is going to ship before he actually has the men signed up for the job, and as he hopes to pick up the number wanted before train time, he requests enough transportation to cover any men he may be able to sign up between the time he gets the pass and the time the train leaves. This results in parties of men traveling over the road with passes reading greatly in excess of their actual number. The usual thing for the man who holds the pass to do under these circumstances is to look around the depot for someone traveling in the same direction as himself and to sell him a ride for any price that he can get. It is not unusual for a man to travel alone on a pass good for 50 or 60 men because he is the only one of the party to accept the job between the time the pass is obtained and leaving time.

Probably the less said about graft in connection with the employment of labor the better, but the periodical discharging of officials and employees for this reason is sufficient proof of its existence. This graft is the natural outcome of the present system of employing labor, and it will exist in some form as long as the present system is used.

### EXPERIMENTAL SYSTEM.

In an effort to prevent the misuse of transportation, and to increase the efficiency of the labor employed, the writer has experimented with different systems of checking men at the time of shipment. These experiments have continued over a period of about two years, and while no additional force has been employed or expense incurred in conducting them, the results obtained have fully demonstrated that the theory involved is practical. The first plan tried was as follows:

When an employment agent had men to send to work on this road he would advise the chief engineer's office by telephone, giving the name of one of the men in the party, and upon what train the men were to be sent. A ticket was then filled out with the name of the man in charge of the party, destination, date of expiration, etc., but the number of men in the party was left blank. A clerk in the chief engineer's office, who had had considerable experience on construction work, and who acted

*Rewritten from a report made by the author for the officials of a Western railway system, October, 1910.

as "labor inspector" during these experiments, then took the ticket to the depot where the labor agent, or man in charge of the party, pointed out to him each man who was to travel on the ticket. He carefully examined the men to see that they were capable of doing the work for which they were being hired, and saw that as far as it was possible for him to determine, there were none in the party who were not entitled to be there.

After satisfying himself that all the men were entitled to travel free he filled in on the ticket the actual number of men that were to travel upon it, assisted with the checking of the baggage and identified each man for the ticket collector as he passed through the gate. After the ticket had been properly punched by the collector it was handed to the man whose name appeared upon it and the party proceeded on its way in the usual manner.

After this plan had been used for some time it was found that the men would sometimes sell their places to persons not entitled to free transportation after the conductor had checked them up. It was also found desirable to furnish individual tickets in order to provide a record of each man who traveled over the road free. With this in view a special ticket was printed good only on the train number and date punched in the margin, the point of origin and destination being printed on the ticket. The employment agents were instructed to furnish the names of the men they wished to ship to the inspector, and he in turn placed the number of the ticket against the man's name as he passed through the gate. The use of these individual tickets simplified the checking of trains by conductors and afforded a means of ascertaining at any point that the man traveling on a ticket was the same person as the one to whom it was issued.

### PROPOSED PLAN.

In organizing a labor department for a railway system that covers a large territory, the first consideration should be the central headquarters from which all labor matters will be handled. These headquarters should not only have charge of the employment of all labor, but should be responsible for the efficiency of all labor employed. It should be the duty of this bureau to observe closely the relative efficiency of different nationalities on various kinds of work, and to so distribute the available supply of labor as to obtain the best results for the whole system without constantly disbanding and reorganizing extra gangs, construction forces, etc. There can be little doubt that the constant discharging of men on one division on account of lack of work and their re-employment on another division as soon as new work is undertaken, on a large railway system covering considerable territory, is largely unnecessary.

With the central bureau to distribute the forces, the men could be transferred from one part of the system to another as conditions require, thereby keeping the men constantly employed, adding to their efficiency, and doing away with the repeated breaking in of "green labor."

The labor department should have at its head a labor commissioner, who should have sole and complete charge of all matters pertaining to the employment and distribution of labor forces. He should report to the officer in charge of maintenance and operation, and should receive reports relating to all matters in his department from all officers in charge of operating and maintenance units. The employment offices, which it would be necessary to establish at various points, should be directly in charge, as should all inspectors, special agents, and other men connected with his department.

The labor commissioner should have a staff of inspectors whose duties should include keeping in constant touch with the labor situation at all points on the system, living conditions of the men, relative efficiency on various classes of work, as well as the inspection of the various employment offices. These men should not be given any particular territory to cover, but should be detailed by the labor commissioner to any point where their services might be required. At times it might be necessary to detail the entire corps of inspectors to one locality, and again it might not be necessary to send an inspector to a certain point for a long period.

In selecting these inspectors a point should be made of employing men of different nationaltities, or those who are familiar with the languages and customs of the various classes of labor usually employed, but it should be understood that the men are not to be specially detailed to the supervision of the class with which they are most familiar, but are to be detailed to all classes of inspection work, at all points on the system.

It would undoubtedly develop that certain inspectors were better qualified to perform certain duties, and these men would, from time to time, be detailed to special work, but the policy in regard to these inspectors should be to train them to represent the labor commissioner and the labor department at all times, and not to regard themselves as specialists detailed to certain fields of activity.

It will be found necessary to establish employment offices in the various cities that have become distributing points for labor, but these offices would be run on different lines from the employment offices now conducted by private persons. They should be in charge of men experienced in actual working conditions on the track, and it would be best to get roadmasters who have been disabled or retired, if possible. In the case of an important office, it might be found desirable to detail a young roadmaster or assistant from the operating department for this work.

The men in charge of these offices should keep in constant touch with the condition of the labor market in their respective localities, and should keep the labor commissioner advised of any available supply of labor in their vicinity.

The establishment of these offices would enable the railway to obtain a better class of labor than that which they obtain at the present time, as good men are unwilling to accept a job offered them when they know that the only interest the labor agent has in hiring them is the fee which he will receive. Men are calling at railway offices daily inquiring if the jobs offered by the employment offices actually exist, and they all tell the same story—that they are willing to pay the labor agent for a job if they are sure that there is a job, and that it is as he represents it, but that they have been fooled so many times they are afraid to take another chance.

It would not be advisable to ask an employment fee in these offices, for the reason that the laws in some states prohibit an employer charging a fee for a job, and even if this were not so the class of men employed as laborers are as a rule so ignorant and suspicious that the charging of a fee would probably prejudice them against the company, which is just the effect which the establishment of these offices is meant to prevent. However, the efficiency obtained by the establishment of company employment offices, and the creation of a labor department, would more than pay for the expense involved in the carrying out of this plan. When the amount of misused transportation and disloyalty to the company caused by the present system is taken into account, there can be very little doubt in the minds of practical railway men but that it is time for a change of some kind to be made in the method of handling the employment and direction of labor.

The following is a rough estimate of the cost of carrying out the above plan on a system employing ten thousand laborers.

| | | |
|---|---|---|
| *General Headquarters—* | | |
| Salary of labor commissioner | $3,000 | |
| Salary of chief clerk | 1,440 | |
| Salary of stenographer | 960 | |
| Salary of inspectors (4 at $1,800) | 7,200 | |
| Traveling expenses of commissioner and inspectors | 6,000 | |
| Office rent, stationery, etc | 1,200 | |
| | | $19,800 |
| *Four Employment Offices—* | | |
| Employment agents (4 at $1,500) | $6,000 | |
| Clerks for above (4 at $900) | 3,600 | |
| Office rent, light, fuel, etc. (4 at $1,000) | 4,000 | |
| | | 13,600 |
| | | $33,400 |

*Cost of Carrying Out Plan (Continued).*

| | |
|---|---|
| Least possible increase in efficiency of labor, 10,000 men at 5 cents per man per day | $180,000 |
| Less expense of operating labor department | 33,400 |
| Net saving to company per year | $146,600 |

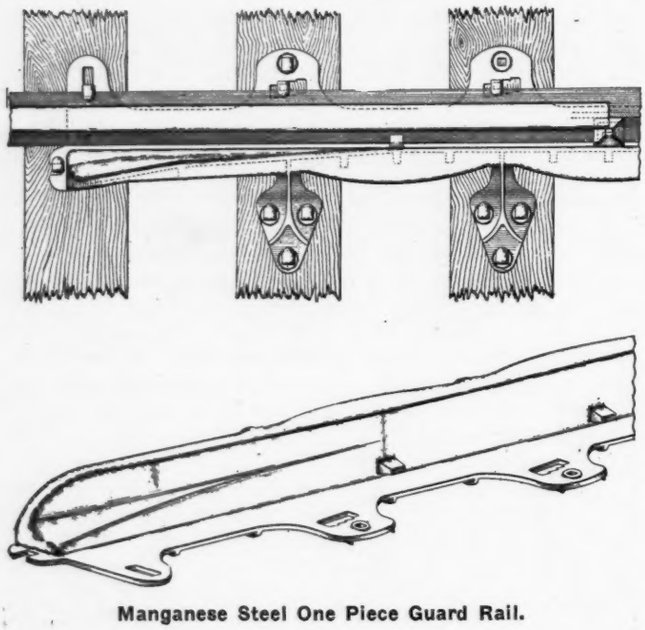
The foregoing figures are based on a very conservative saving of labor, but when it is understood that the duties of the inspectors include the training of laborers in the best manner of performing their work, and that when the best men have been found they will be given permanent employment in the company's service, it is not hard to believe that the saving will reach three or four times this figure.

The foregoing is, of course, only a brief synopsis of what can be accomplished by the establishment of a labor department, but will serve, I hope, to open the mind of the reader to the great opportunity not only of reducing a great existing waste to the railways, but to better the condition of the thousands of laborers who help to make up the working forces of the roads.

## MANGANESE STEEL ONE-PIECE GUARD RAIL.

In the issue of the *Railway Age Gazette* of November 17 there are described a home-made arrangement in which a guard rail was equipped with tie plates and continuous joints so that it acted as a unit with the main rail and required but little maintenance. The Ajax Forge Company of Chicago has developed a guard rail to accomplish this same purpose, and which has the advantage of greater life, owing to its being made of manganese. This is essentially a one-piece guard rail combining with it rail braces, tie plates and filler blocks, and so does not require the customary auxiliary attachments.

A plate extends under the main rail and is provided with



**Manganese Steel One Piece Guard Rail.**

slots for varying widths of rail base, through which the rail is spiked to the ties. Four braces project out at the rear of the guard rail and are spaced to come over the ties. Lugs projecting against the web of the rail maintain the proper spacing between the guard and the main rail. By such construction a load on the main rail tends to hold the guard rail in position and the base plate prevents the running rail from cutting into the ties, in this way maintaining the same relative height between the main and guard rails. This base and the rail braces also resist any tendency toward overturning. No bolts are used, as the guard rail is simply spiked to the tie. Because of the absence of a large number of parts the maintenance cost is reduced, while the first cost is practically the same as that of the ordinary guard rail with all attachments. The cost of installation is very small, as one of the guard rails can be put in place within a few minutes after the ties have been spaced. The length, which is 8 ft. 6 in., is interesting as indicative of the growing

**Manganese Steel One Piece Guard Rail in Track of C. & N. W. Chicago.**

tendency of maintenance men to shorten the guard rail behind the point of the frog.

The first guard rail of this type was placed in the tracks of the Chicago & Western Indiana in May, 1911, and has been in service about nine months. It has since been installed on about 90 other roads.

## HOW THE ROADMASTER CAN PROMOTE EFFICIENCY.*

BY M. GANLEY,
Roadmaster, A. T. & S. F., Argentine, Kan.

The matter of roadmasters promoting efficiency among foremen is up-hill work at the present time, as the material is very limited to draw foremen from. It is a good policy to give foremen who are new beginners as much personal time as is possible without neglecting any other work. A roadmaster should go out on the work with the foreman, especially if he is lax and does not accomplish enough for the force he has, and endeavor to educate him up to the cheaper method of getting a piece of work done and to get good results. Some will be a little slow, but if they show a disposition to learn and improve, the roadmaster's time is well spent.

I gather all the foremen together at meetings, and then call on each of them to discuss some subject that pertains strictly to their work. They are also permitted to bring up anything they think will result in a saving or betterment to the company. Of course, things of the last mentioned nature are passed on to the superintendent, but any subject pertaining to track work is thoroughly discussed. A foreman at one end of the division will have worked out a scheme for doing some kind of work, and by bringing it out in the meeting, all the other foremen get the benefit of it.

The roadmaster should endeavor to create a feeling among his foremen that they are glad to have him come around and visit their work. No foreman is much good to a roadmaster or the company if he is afraid of his superiors and detests to have the roadmaster show up on the work. When a foreman thinks he has been mistreated, the roadmaster should point to his work and give him his side of the question. In general, after he has weighed the matter he sees that he has been treated fairly, and as a rule he is frank enough to admit it. In this way the roadmaster does not create a feeling among his foremen that he feels he is better than they are, and this enables him to get in closer touch with the men. If one has occasion to speak to a foreman concerning some disregard of current instructions, he

*From a paper entered in the contest on How the Roadmaster Can Promote Efficiency, which closed July 1, 1911.

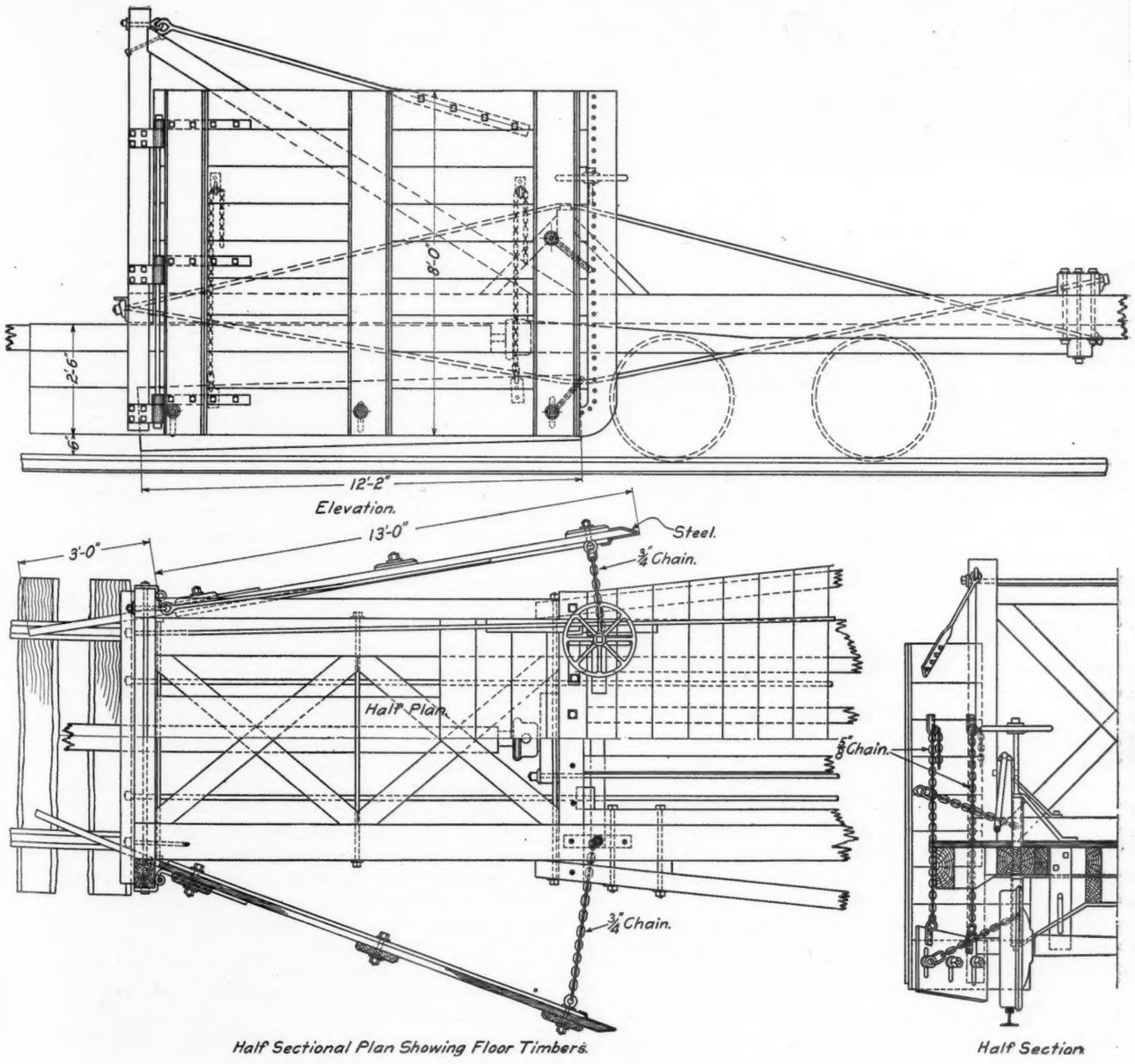
should talk to him pleasantly. If he has made a mistake in regard to instructions unintentionally, but owing to an oversight, proper handling by the foreman without becoming abusive, which is too often the case, causes the foreman to become loyal to the roadmaster, and if the roadmaster is loyal to the company, as he must be, if he handles his men properly, results are good for the company, foreman and roadmaster. The foremen take more interest in their work, endeavor to do more of it, and as they pass over a piece of work will endeavor to make it look neat as well as serviceable.

## THE SNOW CRAB.

An effective device for cleaning out a cut which is filled with, snow is the snow-crab used on one of the northern roads. The repeated pushing back of successive snows in cuts results in the formation of banks of hard snow on each side of the track which finally resist the crowding action of the snow-plow wing and are beyond the reach of the rotary plow. The snow crab was devised to relieve this situation and readily loosens snow so hard that it will strip teeth from the gear wheels controlling the movements of the wings of the Russell snow plow or break the set of wings of the "V" plow. This machine is simply and readily constructed in any well equipped car shop.

The snow crab is a noseless "V"-shaped wing plow, with steel protected cutting edges on the vertical wing heels. As its name implies, it is designed to move slowly backwards, thus scraping the hard snow from the slopes of the cut into the open space between the wings on to the ties and between the rails, from which position a rotary or Russell snow plow readily throws it out of the cut. Very hard snow sometimes requires two, but rarely three, trips of the crab through the cut.

As the plans indicate, the snow crab is a stout, wooden frame extension on the end of a flat car which is strongly braced and covered with metal. It is 15 ft. long and is designed to support two laterally spreading wings which are strongly hinged to vertical posts. These wings extend 3 ft. in front of these posts and 13 ft. back, and may be spread to a total cutting width of 16 ft. 8 in. The wings extend to a height of 8 ft. 6 in. above the top of the rail. The bottoms of the wingsare attached to the car with ⅝ in. chains and hangers. Steel plates ¾ in. x 15 in. by 12 ft. 2 in. long, are provided to serve as shoes, and to scrape the snow from above the top of the ties. The shoes may be raised or lowered by means of the chains. Ordinarily the outer




**Plan and Elevation of D. S. S. & A. Snow Crab.**

ends are lowered to clear the snow away about 2 in. below the top of the rail.

A 7 x 7 in. timber, bolted under the center of the floor truss of the car and connected with the drawbars, extends 4 ft. 6 in. beyond the end sill, terminating in a link and pin coupler. Truss rods and floor timbers extend well back beyond the flat car truck and are securely held by transverse timbers. The wings are held in position by ¾ in. chains and ⅞ in. rods. The

**Snow Crab Used on D. S. S. & A.**

weight of the crab is counterbalanced by loading the flat car with scrap car wheels.

This machine was devised by James Bice, formerly locomotive engineer on the Duluth, South Shore & Atlantic, and now mechanical engineer of the Michigan Railroad Commission, and was first built under the direction of J. J. Conolly, superintendent of motive power and machinery of the Duluth, South Shore & Atlantic. A crab of this type has been in use on this road for about 20 years, and is still in first class condition.

## USING A STEAM SHOVEL TO SPOT CARS.

The Chicago, Burlington & Quincy used a steam shovel in place of a switch engine to spot cars when filling its ice house in the Chicago yards in January. At this point about 28 cars of ice were unloaded daily, only four of which could be set at the ice house at a time. This made seven settings of cars per day, and under the old arrangement required the constant use of a switch engine. This winter a steam shovel, which would otherwise have been laid up for the winter, was placed on an adjacent track beyond one end of the ice house. The loaded cars were placed beyond the opposite end of the ice house by a switch engine each morning. A cable wound about the drum of the steam shovel was attached to the cars and they were pulled to the ice house four at a time. When these cars were emptied they were pulled out of the way and four additional cars pulled down. In this way the steam shovel, requiring but one man, replaced a switch engine and crew, and a charge of $35 per day was reduced to $6, making a saving of $29 daily. About $500 was saved in filling this one 1,200-ton ice house, and similar results were secured in filling another ice house on the same road at Galesburg, Ill.

Rapid progress is being made in the construction of the Cooma-Nimitybelle Railway, New South Wales. It is expected that this line will be opened to traffic within the next five or six months.

## OPERATION OF MOTOR CARS IN COLD WEATHER.

BY C. G. MAHANA.

Gasoline motor cars are rapidly coming into use for section forces, signal maintainers, inspection service, etc. It is very important that the men who use them should understand fully how to operate them. They have one characteristic which is the cause of no little trouble and complaint to some who use them who are not fully acquainted with their correct operation and care, but which may be avoided if a few simple precautions are followed.

This is their tendency to refuse to "start" in cold weather. It is a well-known fact that any gasoline engine is more difficult to start when it is cold than when it is warm. This is due to the fact that gasoline does not vaporize easily when it is cold, and the vapor is easily recondensed by cold to liquid gasoline. Gasoline in the liquid form will not burn; it must first be vaporized or mixed with air in the form of vapor. When an engine is started in cold weather, therefore, there is only a small charge of gasoline vapor in the cylinder when the spark is flashed across the points of the spark plug, and a large portion of what little vapor the carburetor does supply is recondensed by contact with the cold walls of the intake pipe, the cylinder and the piston. If a few charges can be secured which are large enough and rich enough to be fired and start the engine, the cylinders will usually become warmed sufficiently to promote vaporization rather than prevent it, and the engine will then take care of itself and run as usual. It is, therefore, sometimes advisable in cold weather to use some means of producing the first half dozen impulses or explosions, which is not necessary in warmer season of the year.

In the first place, it is well to apply a little heat to the carburetor itself. This is conveniently and safely done by pouring warm water over it, wrapping a bag of warm salt or sand around it for a few moments, or by any similar means which may suggest itself to the operator. Heat should not be applied by means of a torch, live coals, or any like method where fire is used directly, as there is danger of an explosion.

After the carburetor has been somewhat warmed a small amount of gasoline (half a thimbleful is usually sufficient) should be injected into each cylinder through the priming cup, and the cup should be closed. This is termed "priming the engine." The carburetor should then be "flushed" or "flooded" by means of the little plunger provided for that purpose. If, now, the crank shaft is revolved the engine will seldom fail to start. Of course, do not forget to have the gasoline turned on, the switches closed, and the throttle open.

In winter, especially, procure a good grade of gasoline if possible, as the higher the grade the more easily the gasoline vaporizes. It is also a fact that the higher the grade the harder it is to get it, but if at least 62 or 64 deg. (Baume scale) gasoline is not furnished for ordinary use, it will be advantageous to procure a small amount of higher test, if possible, for priming purposes. The grade or density of gasoline may be determined by means of a hydrometer by anyone having access to one. The proper temperature at which to make the test is 60 deg. Fahrenheit, as gasoline expands and becomes lighter when heated, and becomes heavier when cooled. If, therefore, it is tested at a temperature much above or much below 60 deg. the reading obtained will be incorrect and a correction factor must be applied. This amounts to approximately one degree Baume for each eight degree variation from 60 deg. temperature. In other words, if gasoline tested at 68 deg. temperature shows a reading of 65 deg. Baume on the hydrometer, 64 deg. is the correct reading. The same gasoline tested at 52 deg. temperature would show only 63 deg. Baume on the hydrometer.

If a high test gasoline is not available for priming purposes, a good plan is to carry a small quantity of it in a bottle or squirt can. On extremely cold days warm this gasoline before using, if convenient, by holding the bottle or can in hot water for a minute or two.

There is another liquid called sulphuric ether often more

easily procured than high test gasoline, as it can be purchased at any drug store, and which is especially good to prime with, as it is much more volatile, or, in other words, more easily vaporized, than gasoline. Being much more volatile, however, it is also much more explosive, and correspondingly greater care must be exercised in its use. It is also more expensive than gasoline.

Many of the motor cars on the market are of the two-cycle type, and the lubricating oil for the engine is then mixed with the gasoline before it is put into the gasoline tank. This affords a good chance to obtain warm gasoline for starting. The lubricating oil is usually mixed in the proportion of one-half or three-quarters pints of oil to one gallon of gasoline. In cold weather the lubricating oil can be thoroughly warmed before mixing it with the gasoline. This gives a tank of warm gasoline to start out with without any danger of explosion.

Usually there is some water mixed with gasoline which often separates, and as the water is heavier it settles in the low points of the pipe connections to the carburetor or in the carburetor itself and then freezes, blocking the pipe and preventing the gasoline from flowing. To determine whether this has occurred flood the carburetor, and if gasoline flows continually the pipe is probably clear. If it is blocked, heat should be applied to the low points to melt the ice. Even in warm weather it is not a bad plan to strain all gasoline used through a chamois skin to remove the water, but in winter it is an extremely good plan, as it will prevent trouble with frozen carburetors and feed tubes. Gasoline flows slowly through a chamois skin, and it may be found that it will take too long to strain it at the time of filling the tank, in which case it is a good plan to have an extra gasoline can and strain the gasoline into it at convenient times, then fill the tank on the car from that can. Another way to prevent freezing is to drain the carburetor and feed tube at night after closing the gasoline tank shut-off cock. The gasoline thus drained out may be caught in a cup and poured back into the gasoline tank.

It is a good plan in cold weather to warm up the engine in the car house by running it a moment or two there before taking it out into the colder air. On cars which have a clutch for freeing the engine from the driving mechanism, this is simple. With the direct driven type of cars such as is largely used for section work and signal maintenance, where the driving axle forms the crank shaft of the engine, or is directly connected to it by gears or chain without a clutch, the engine can be run in the car house by raising the end of the car on which the engine is located and sliding a box under it so that the driving wheels will not touch the floor, then starting the engine by revolving the driving wheel or wheels with the hands. The engine will start more easily this way without a load than by pushing the car on the track, especially if the rails are frosty.

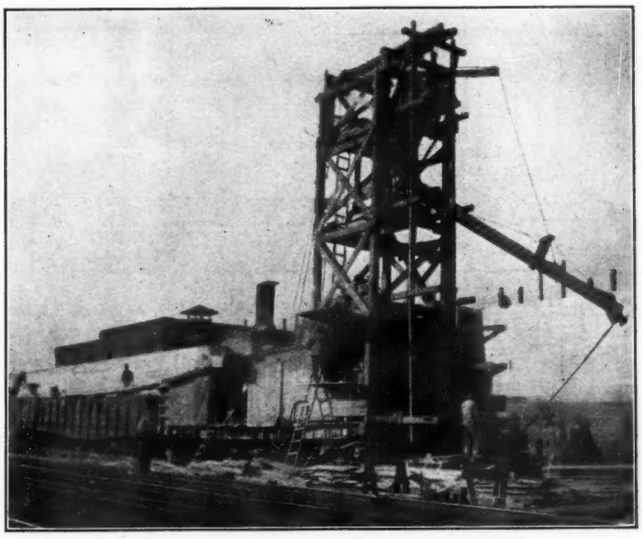
As stated above, after the engine is once started and warmed up, it usually will continue to operate without trouble, but it is a fact that a gasoline engine operates within reasonable limits with a greater fuel economy at high temperature than at low. On water-cooled cars it is, therefore, a good plan to somewhat reduce the cooling capacity of the radiator during the winter months. This is easily done by covering part of the radiator with a piece of oil cloth or canvas. The water will continue to flow through the entire radiator, but air will be drawn only through that part which is not covered by the cloth, and where there is no air circulation there is practically no cooling effect. In this way the cooling capacity of the radiator can be reduced in almost any desired proportion.

Precautions must be taken on water-cooled cars to see that the water does not freeze in winter and burst a cylinder or radiator. An anti-freeze solution is the best precaution. The following table gives the freezing points of anti-freeze solutions made by mixing various proportions of alcohol, glycerine and water. Calcium chloride solutions are sometimes used, but they are injurious to some of the parts through which the solution must pass.

| Wood Alcohol. | Glycerine. | Water. | Freezing Point. |
|---|---|---|---|
| 5 per cent. | 5 per cent. | 90 per cent. | 25 deg. above zero |
| 10 per cent. | 10 per cent. | 80 per cent. | 15 deg. above zero |
| 12½ per cent. | 12½ per cent. | 75 per cent. | 8 deg. above zero |
| 15 per cent. | 15 per cent. | 70 per cent. | 5 deg. below zero |
| 16½ per cent. | 16½ per cent. | 67 per cent. | 15 deg. below zero |
| 10 per cent. | ..... | 90 per cent. | 18 deg. above zero |
| 20 per cent. | ..... | 80 per cent. | 5 deg. above zero |
| 25 per cent. | ..... | 75 per cent. | 2 deg. below zero |
| 30 per cent. | ..... | 70 per cent. | 9 deg. below zero |
| 35 per cent. | ..... | 65 per cent. | 15 deg. below zero |
| ..... | 10 per cent. | 90 per cent. | 28 deg. above zero |
| ..... | 30 per cent. | 70 per cent. | 15 deg. above zero |
| ..... | 40 per cent. | 60 per cent. | 5 deg. above zero |
| ..... | 50 per cent. | 50 per cent. | 2 deg. below zero |
| ..... | 55 per cent. | 45 per cent. | 10 deg. below zero |

## CONCRETE DISTRIBUTING TOWER.

The accompanying photograph shows a concrete distributing tower which has proved very satisfactory in placing concrete for a retaining wall alongside operated tracks where it was impossible to give over more than one track for construction purposes. The tower, mixer and hoisting engine are mounted on a standard flat car to which are coupled sand and stone cars. The material from the cars is loaded into barrows and wheeled on a runway over the center of the cars which connects to the roof of the house enclosing the hoisting engine. A one-yard Foote batch mixer is arranged to feed from this level and discharges into a one-yard hoisting bucket. This bucket is elevated by a 35-h. p. Lambert engine, and the concrete dumped at the top



**Concrete Distributing Tower.**

of the tower into a hopper which feeds an open trough. This trough is supported by a cable passing over pulleys set in the ends of a timber at the top of the tower which is pivoted on a dolly. The hoisting engine has a double drum, one line being used for hoisting the bucket, and the other for supporting this trough. The trough can be raised or lowered and sprung laterally by pulling the lower end to either side. The chute is 24 ft. long, and is strengthened by a twisted wire truss rod passing over a wooden strut. The hoisting cable is of ⅝-in. steel, and the vertical distance from rail to hopper is 40 ft. The plant requires 27 men, eight of whom are kept in the forms. With this force 175 yds. of concrete can be placed in a day, which completes one section of the wall on which the plant is being used. This plant was designed by A. H. Bannister, general superintendent of the Brownell Improvement Company, Chicago, and is used on work being done by that company.

## SHIMS.

BY E. R. LEWIS,
Division Engineer, Michigan Central.

Of the factors in the problem of railway maintenance, none are of more vital importance, more constantly altering and at the same time more continually present in one form or another than track conditions resulting from climatic changes. All changes in weather have some influence on track conditions which must be anticipated, met and overcome by sheer force, strategy and constant watchfulness as they appear. Altitude, latitude, longitude all exert their individual and combined effects on track, largely through some phase of the presence, or absence of, moisture.

Many American railways traverse a stretch of country so extensive that more than one "climate" is observable in a journey from terminal to terminal. The railways of the southern half of North America, except in the highest altitudes, are not usually affected at any time of year by frost, while on the other hand the railways in the northern half of the continent have to fight frost continuously during six months of the year.

On these northern roads it is impracticable to do any track

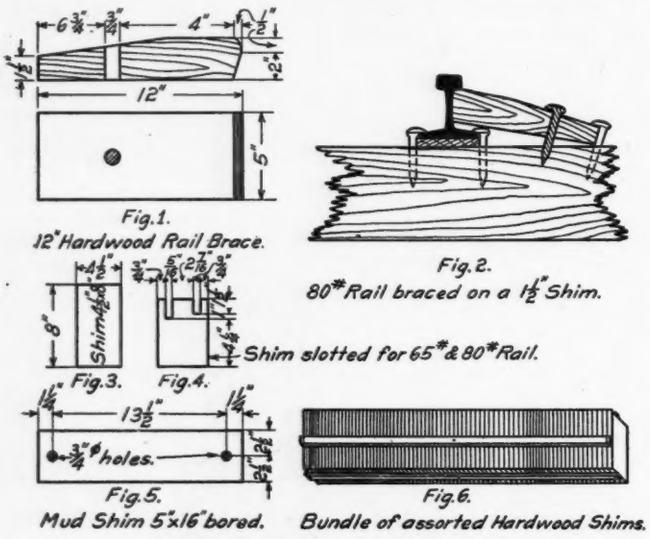



Fig.1. 12" Hardwood Rail Brace.
Fig.2. 80# Rail braced on a 1½" Shim.
Fig.3. Fig.4.
Fig.5. Mud Shim 5"x16" bored.
Fig.6. Bundle of assorted Hardwood Shims.

**Various Types of Shims.**

work which includes the moving of ties or ballast during the winter months. The track cannot be raised, tamped or lined. It is at this season, moreover, that any unevenness of track surface is most likely to result in the breaking of rails; a very large percentage of all the rail failures of northern roads occurring during the winter and early spring.

There are years when the fall rains are extraordinarily late and long continued, as was the case last autumn in the middle states. These abnormal late fall rains, coming after the track has been surfaced and prepared for the winter, saturate the newly worked ballast and roadbed and are quickly followed by freezing weather. These conditions work much mischief to the track during the whole of the following winter and spring until the moisture can be eliminated from the ballast and roadbed.

Water reaches its maximum density at + 39.1 deg. F.; in other words, at that temperature water occupies its minimum of space, and any variation from that temperature causes it to expand. The expansion of moisture in the ballast or roadbed, or both, results in like expansion in the ballast or roadbed, which, following the line of least resistance, expands upward. As it bulges upward the track rises irregularly with it because of the uneven rise of the ballast containing various percentages of moisture. This erratic increase in elevation of the track surface is commonly known as "heaving."

Heaving results in track conditions which so severely test the strength of rails, splice, arch bars and spring hangers as to be highly dangerous to traffic. Crossing plank must be closely watched to prevent them heaving high enough to catch and break the pilots and footboards of locomotives and switch engines. Such accidents may frequently occur in extreme weather because of the collection of water from engines standing in front of depots, freezing under the planking of platforms.

Heaving is accentuated at road crossings also, the conditions under ties covered by plank being different from the conditions under ties not so covered. It is frequently necessary to remove from track planks which have a tendency to heave. In freezing weather snow, ballast or earth may be safely put in place of the plank temporarily removed. It is impossible to cure a track from heaving, but this may be prevented by altering conditions in summer so that moisture cannot be retained.

If the track heaves in winter, the only antidote during that season is shimming. One rail may be higher than the opposite rail; both rails may be equally lifted, say 2 in. above grade, for a distance of 2 to 10 ft., or there may be several such bumps in succession. To nullify these inequalities of surface, which "ride like a roller coaster," it is necessary to provide for raising the rails to corresponding elevations with the higher heaved spots, or to provide easy runoffs from the abrupt vertical frost curves. Shims are used to accomplish this.

The word "shim" is of uncertain origin. It is derived from the old English "shimmer" and Anglo Saxon "scimerian," meaning to shine uncertainly. A shim is placed between surfaces between which there is a shimmer of light, and may be broadly defined as a piece of wood or metal placed between two parts to make a perfect fit.

In American railway maintenance both wrought iron and wooden shims are used, the former to space adjacent rail ends to the proper distances from each other to allow for expansion and contraction due to extremes of temperature, the latter to correct unevenness in track elevation.

The permanent cure for heaving track is, of course, perfectly drained roadbed and ballast. Comparative exemption may be secured by using plenty of clean, crushed stone ballast. The finer the ballast, the more it will heave. It is doubtful if any railway track traversing a country in which frost must be reckoned with can be so perfectly appointed as safely to do without shims entirely. There are, however, many railways which do without shims, or which use home-made shims of soft, decayed and warped wood. Into such ill-advised purchases enters the element of ignorance of the uses to which these little squares of wood are put, ignorance of the vast importance of shimming to the safety of winter traffic and of the prevention of rail and engine failures and defects of equipment. To the uninitiated shims are only chips of wood which cost a paltry few cents per bundle and are allowed to lie about the roadbed in spring.

Is there any good reason why, year after year, a large percentage of the better roads of North America get along without adequate shims and shimming in winter? Surely the matter is of sufficient importance to merit scientific study and the placing of the track in that condition which will reduce to a minimum the accidents to life and property resulting directly and indirectly from heaving track. It requires time, effort and patience to forcibly impress men of experience with any new idea relating to their business. It is evident from the apparent lack of literature extant upon this subject of shims that such effort has to date been sadly lacking or largely wasted.

Track shims should be of different thicknesses to fit the varying inequalities of surface resulting from the expansion of ballast containing various percentages of moisture. They must be of different lengths and widths to correspond with the widths of rail base and cross ties. They may be plain, bored or slotted, as shown in the figures. They may be made of any wood having enough transverse fiber to withstand the pressure of traffic for at least two seasons. Shims of oak, maple, beech, birch and even hemlock have given good results. It is important that they

be well seasoned before being placed in track, as shims of green wood will not endure, but crush readily. This seasoning may be done by air or kiln drying. The latter method is not expensive and is more practicable since few shim makers keep stocks in hand from one season to another. The plain shim, which is most used, is bought in bundles of 80 to 110 pieces, of thicknesses varying from ⅛ in. to 1 in., as ordered. These shims, about 4½ to 6 in. in width and 8 to 9 in. long, are tightly packed between two red oak end pieces and baled with four elm slats. The average cost of such a bundle is approximately 22½ cents at the mills.

A mile of moderately heaving single track may require in one season five to ten bundles of plain shims and possibly one hundred thicker shims. These thicker shims are more than 1 in. in thickness and 5 in. wide by 16 in. long. They are made of hardwood, usually of white oak, and bored for spiking on top of the tie, after removal of the tie plate, as shown in one of the illustrations. These shims may also be used for soft track in summer, and are known as mud shims.

The slotted shim is a patented article and is a trifle more expensive than the plain shim.

It is made ordinarily with two spike slots in one end, the deeper slot being of such depth that when the shim has been applied from the inside of the rail in such manner that the outside spike engages the slot, and the shim is pushed home, the plain or unslotted end will be flush with the inside edge of the foot of the lighter of two rail sections for which the shim is designed. The other shallower slot is designed to allow the same shim to fit a heavier rail base. These shims cannot, of course, be used on top of shoulder tie plates unless applied from the outside of the rail. The slotted shim is made by the veneer process, as this is a most economical method of manufacture, and the smooth surfaces are not detrimental, as it is impossible for the shim to slide after the track spikes are replaced on each side of the rail. This immobility tends to greatly lengthen the life of the slotted shim as compared with other sorts.

### APPLICATION.

The thin, plain shim is put in place by first starting both the inside and outside spike on the tie and pinching up the rail just enough to slip the shim of desired thickness cornerwise under the inside of the foot of the rail on top of the tie plate. As it is pushed further under the rail, the shim is gradually straightened between the inside and outside spikes, which should be near opposite edges of the tie, until it lies with its longest dimension parallel with the rail and crosswise of the tie. Being of the same approximate width as the rail, the shim will scarcely show when properly placed.

The heavy shim is applied by removing both spikes and tie plate, unless the latter is flush with the tie, and spiking the shim to the tie through the ¾-in. diameter hole provided near each end. Holes are then bored to engage the track spike driven to hold the rail to gage. It is frequently necessary to adze the tie before applying a heavy shim. No brace, of course, is used in this connection.

The slotted shim is constructed so that its slots run with the wood grain. To place it the inside spike is first removed entirely. The outside spike is started and the rail pinched up, as is done in applying the plain shim; the slot is fitted to the spike as the shim is pushed home; and the inside spike redriven, thus fastening the shim in place.

Serviceable, once used shims should be returned to the car house, re-crated and further seasoned in the well-pressed bundle to prevent warping.

### BRACES.

High shimmed track, whether straight or curved, should be protected from spreading by substantial braces of metal or hardwood. It is commonly accepted practice on the northern railways, where wood is still plentiful, to use the hardwood brace 2½ in. x 5 in. x 12 in., as shown in one of the figures. As shown in another of the figures the head of the brace is beveled to fit under the ball of the rail while the foot rests on the tie into which two track spikes are driven and drawn tight to the brace. A third spike is driven into the tie through the ¾-in. diameter hole bored 4 or 5 in. from the foot of the brace to prevent side slipping. Crossing spike or coach screws are sometimes used instead of this third spike in case of very high shims. On curved track braces should be used to protect all rails on any considerable number of shims ½ in. or more in thickness.

### THIN SHIMS.

The mistake of using very thin shims is not uncommon. The impression has gained ground that very thin shims will correct minute discrepancies in elevation and therefore a first-class surface may only be maintained by their use. Many roads buy large numbers of 1/16-in. shims, seemingly on this hypothesis. As a matter of fact a shim of thickness of less than ⅛ in. is not only useless, but a detriment.

It is fair to suppose that a great many railways in this country space track ties at approximately 2 ft. between centers, though it is not admitted to be the best practice. Assume, however, a space 2 ft. between centers and a difference in elevation of the adjacent ties of ⅛ in. This discrepancy work out to a grade of 0.52 per cent. which is not sufficient to produce very great discomfort or any danger whatever. Half that grade corresponds to the difference in elevation which is corrected by a 1/16-in. shim, the use of which is time and labor lost. The 1/16-in. shim is also too thin to endure under traffic. It blows away when loosened from the bundles; it crushes, splits and wears away under the rail; it warps and cracks in the sun when released. It is expensive to make, expensive to use and worse than useless. Yet because they have always had them, many roads continue to use them.

If a track is too smoothly and thoroughly shimmed in early winter, infinite trouble will result when the milder weather of early spring brings alternate freezing nights and warm days, resulting in wet track at midday and frozen track at night. The much shimmed track goes higher and higher until it becomes dangerous to shim further, when the only recourse is slow order movements of traffic.

### SUPERVISION.

At best the softening weather of early spring brings to a crisis the matter of shimming track. The hourly alterations in temperature above and below the freezing point, the early rains, late snows and last "cold snaps" cause the trackman much anxiety. Every foot of shimmed track must be constantly watched. It may be down today and up tomorrow. High shims must be exchanged for thinner. The track must be let down gradually, allowing for and following every vagary of the frost. During this period the closest and most varied supervision and the best of good judgment are requisite to the proper adjustment of track to these rapidly changing conditions. The supervisor's place is on the locomotive, the way car and the Pullman car alternately. His duty is to watch for heaved spots, and to wire instructions or drop notes on return journeys, to his section foremen concerning his observations. Locomotive engineers also may be of the greatest help if they will observe and report heaved track. It is not always easy to obtain such reports, for there is often a mistaken idea on the part of the employee that reporting defects out of his direct line of work is tale bearing, whereas it is the most desirable and important information for the well being of all concerned.

### MANUFACTURE.

Shims are sawed from hardwood logs by means of vertical and horizontal circular saws, and shingle gang saws, or they are cut with veneer, shingle or stave knives. The thicker shims are sawed, the thinner pieces are cut or split. A small, fairly well equipped mill will produce about 1,000 plain shims of various thickness per day. The shingle gang saw is a series of vertical

saws set at gaged distances in order to saw a block into several thin strips at one pass. The veneer knife is a horizontal fixed blade which cuts a thin sheet from the circumference of a log revolving toward it till a 6-in. diameter core is all that remains. The shingle knife is a vertical framed blade rising and falling very rapidly, while the shim timber is pressed against a stop block set at a gaged distance behind the knife. The stave knife is similar, but of greater power and scope.

Close and systematic inspection of shims is of course necessary to good results. Only live timber, free from knots and shakes, should be accepted. Shims must be inspected before bundling or crating to obtain proper knowledge of their condition. The lengths of bundles must be determined and insisted on.

This whole matter may seem one of the little things, one of the unimportant details of railway operation. In reality, the importance of good shims and good braces and intelligent use of each is of the first magnitude, and an important spoke in the wheel of the exact science of railway maintenance.

## ABSTRACT OF ENGINEERING ARTICLES SINCE FEBRUARY 16.

The following articles of special interest to engineers and maintenance of way men, to which readers of this section may wish to refer, have appeared in the issues of the *Railway Age Gazette* since February 16:

Pennsylvania Ore Unloading Dock at Cleveland.—The details of construction of the largest ore unloading dock on the Great Lakes were given in the issue of February 23, page 335. The foundation of this dock rests on concrete piles, a large number of which were used. Extensive experiments were made in the manufacture and use of these piles, which were described in detail in the article. This feature of the construction of the dock was discussed in an editorial on page 324 of the same issue.

Important Bridge Development in the South.—An editorial, commenting upon the announcement by the Rock Island of its intention to build a bridge across the Mississippi river at Memphis, and the announcement by the Burlington, Louisville & Nashville, Chicago & Eastern Illinois and Illinois Central that negotiations were practically completed for the construction of a bridge across the Ohio river near Paducah, appeared in the issue of February 23, page 326.

Sibley (Mo.) Bridge.—The general features of the construction of the bridge which the Santa Fe is now building across the Missouri river at Sibley, Mo., were given in an article appearing in the issue of February 23, page 334.

Improvement in Rail Design and Specifications.—An abstract of the paper presented by W. C. Cushing at the Indiana railway commission hearing on the rail question at Indianapolis on February 20 was given in the issue of March 1, page 374. Mr. Cushing discussed the work of investigation which has been carried on during recent years, especially that by the American Railway Engineering Association.

Indiana Commission Investigation of Rails.—The possibilities and the dangers incident to the inauguration of an investigation of rail failures by the Indiana railway commission were discussed editorially on page 368 in the issue of March 1.

Construction of the Milwaukee, Sparta & Northwestern.—The construction of the new line of the Chicago & North Western, between Milwaukee, Wis., and Sparta, was described at length in the issue of March 1, page 382. The line was built to permanent standards as a low-grade freight and passenger line. An interesting type of bridge piers, the Cushing cylinder pier, which was on this work, was described. Special features of the line were discussed editorially in the same issue, page 365.

Progress on the Grand Central Terminal.—The progress on the Grand Central terminal of the New York Central up to June 30, 1911, was discussed by G. W. Kittredge, chief engineer, before the Public Service Commission in New York. An abstract of Mr. Kittredge's statement appeared in the issue of March 1, page 395.

Bascule Bridge over the Harbor Channel at Copenhagen.—An interesting Strauss double leaf bridge over the busy harbor channel at Copenhagen was described by C. Van Langendonck in the issue of March 8, page 425.

Investigation of New Railway Projects.—This subject was discussed fully by A. M. Van Auken from the standpoint of the investor who desires a method of ascertaining whether proper amounts have been spent for the location and construction of a line before he purchases any of its securities. This article appeared in the issue of March 8, page 427.

## HOW THE ROADMASTER CAN PROMOTE EFFICIENCY.*

BY G. LE BOUTILLIER,
Division Engineer, Pennsylvania Lines, Cincinnati, Ohio.

To promote efficiency the roadmaster must, among other things, thoroughly know the district assigned to him and become intimately acquainted with all of the men working under his directions and with him in the maintenance department. Between 40 and 45 per cent. of the expenditures on roadway maintenance is for labor; therefore, he should use the utmost care in properly distributing his forces, in his selection of track, extra gang, and work-train foremen; and in the selection of laborers, giving particular attention to their nationality and condition of health. It is important to see that the laborers who are housed by the railway have sanitary quarters in which to live. During his frequent trips over his district, he should determine whether each gang of men has proper hand and push cars and tools to enable it to carry on its work with despatch.

He should, from personal inspection, make requisitions for material and tools, required for renewals and repairs. As new rail, ties and ballast constitute a very large part of the value of all materials purchased for maintenance, it is particularly important to get the full life out of these materials. In determining what rail is to be renewed, it is necessary for him to consider the class and amount of traffic, and what use is to be made of the rail which will be removed. Frequently it is possible to considerably lengthen the life of main track rail by renewing a greater part, or all, of the angle or splice bars which may have become worn or bent for various reasons. Then again, it is sometimes desirable to renew main track rail, which is only partly worn out, which in turn is used in replacing lighter rail on branch line freight, running, passing and yard tracks.

It is not possible to obtain uniform track by allowing each foreman to determine what ties should be renewed on his section; therefore, the roadmaster should personally, or by a competent inspector, have all main and running track ties examined, and those to be renewed should be plainly marked.

Before the inspection of ties is begun, the inspector should be informed as to where rail and ballast are to be renewed, so as to make proper allowances for disturbing the old ties. The inspector should make a record of the ties marked, as between telegraph poles, to assist the work-train foreman in making proper distribution of new ties, to avoid unnecessary trucking.

The roadmaster should personally inspect all switches, frogs, crossings, switch stands, etc., before their renewal, to determine whether new materials should be furnished, or whether the old articles should be repaired for further use, or should be consigned to the scrap pile. In emergency cases, however, he should allow the foreman to make renewals of this kind. He must see that proper drainage of roadbed is maintained, to prevent damage to ballast and track; and must determine what ballast is to be cleaned. New ballast should be distributed after the old ballast has been cleaned, and only a sufficient amount should be provided for the work in hand, as it is very objectionable to have a surplus of ballast during the winter, either between the track

*From a paper entered in the contest on How the Roadmaster Can Promote Efficiency, which closed July 1, 1911.

or on the shoulder, where it interferes with drainage and often causes snow and ice to collect.

Too much stress cannot be laid on the matter of the proper distribution of labor on work requiring large gangs of men such as laying new rails, making heavy tie and ballast renewals, and distributing and picking up materials with work-trains, to see that no time is lost by poor distribution of labor, and by poor facilities for doing the work.

## SECTION MOTOR CARS ON THE CHICAGO GREAT WESTERN.

The Chicago Great Western has gone into the use of motor cars for section forces more fully than any other road and has gradually extended their use until all sections except those in the larger terminals are now equipped with such cars. Their use has resulted in such large savings in track maintenance that President Felton mentioned the motor car as contributing materially to the very favorable showings made in the last annual report. The following statement shows the monthly savings on the four divisions and also the reduction in the number of foremen and laborers necessary to handle the work:

SAVING BY INTRODUCTION OF SECTION MOTOR CARS.

| | Saving per month. | Cost of cars. | Cost of operation and repairs per month. |
|---|---|---|---|
| Eastern Division ..... | $2,016.00 | $5,320.00 | $88.64 |
| Western Division ..... | 3,576.00 | 5,775.00 | 191.00 |
| Northern Division ..... | 1,998.50 | 5,710.00 | 205.00 |
| Southern Division ..... | 1,914.00 | 6,330.80 | 73.21 |
| | $9,504.50 | $23,135.80 | $557.85 |

REDUCTION IN NUMBER OF SECTIONS AND FOREMEN BY USE OF MOTOR CARS.*

| Division. | Number Sections and Foremen. Old Basis. | New Basis. | Reduction. |
|---|---|---|---|
| Eastern ..... | 41 | 32 | 9 |
| Northern ..... | 80 | 50 | 30 |
| Southern ..... | 61 | 35 | 26 |
| Western ..... | 59 | 37 | 22 |
| | 241 | 154 | 87 |

*Does not include yards or sections not equipped with motor cars.

TOTAL TRACK FORCES BEFORE AND AFTER INSTALLATION OF MOTOR CARS.

| Division. | Summer Basis. Before. | After. | Saving per Month. | Winter Basis. Before. | After. | Saving per Month. |
|---|---|---|---|---|---|---|
| Eastern ..... | 246 | 192 | 54 | 100 | 91 | 9 |
| Northern .... | 342 | 331 | 11 | 161 | 158 | 3 |
| Southern .... | 438 | 361 | 77 | 184 | 168 | 16 |
| Western ..... | 339 | 220 | 119 | 125 | 106 | 19 |
| | 1,365 | 1,104 | 261 | 570 | 523 | 47 |

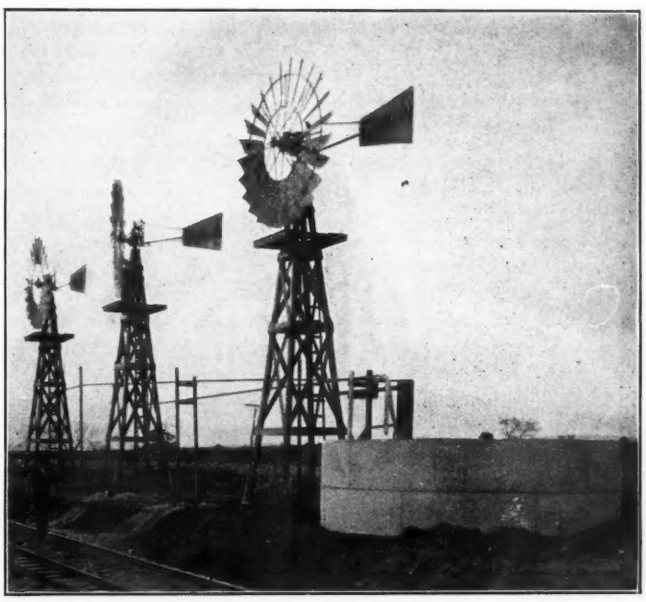
The proposed Mullet Creek-Singleton Railway, New South Wales, would begin at the northern end of the Woy Woy tunnel, about 43 miles from Sydney, and would skirt the eastern slopes of the hills lying to the west of Gosford. The survey has been completed for 24 miles toward Singleton.

## AN UNUSUAL AND ECONOMICAL WATER SUPPLY ON THE FRISCO.

BY F. G. JONAH,
Chief Engineer, Construction, St. Louis & San Francisco.

Early in 1911 the Frisco completed an extension of its Fort Worth and Rio Grande division from Brady to Menard, Tex., a distance of 40 miles. At Brady there was a water supply, the source being Brady creek. At Menard the San Saba river furnishes one of the purest water supplies in the state. It was necessary to have an intermediate water station, and the securing of this was a matter of some difficulty.

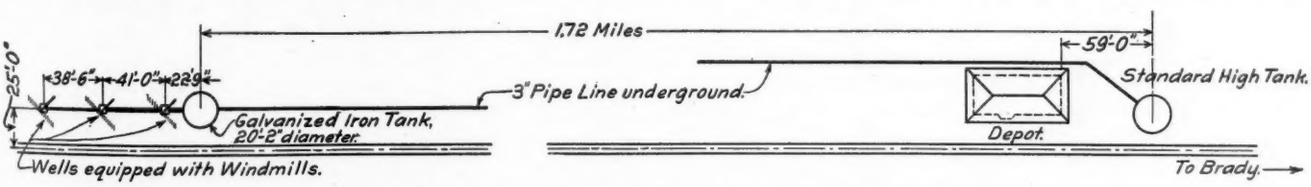
There were no running streams between Brady and Menard,



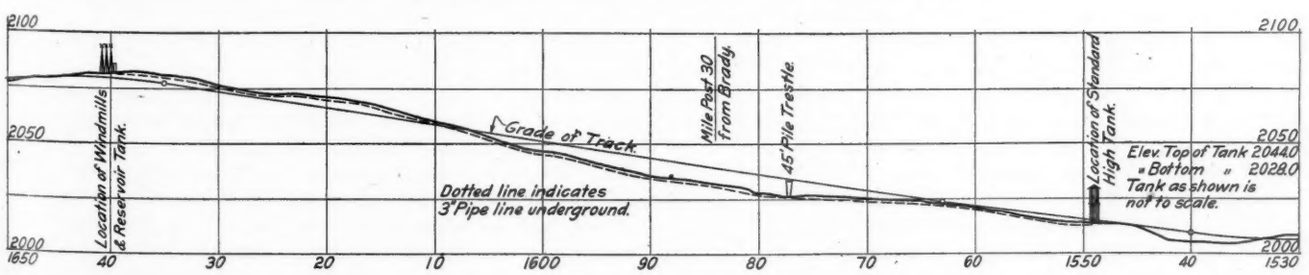
Pumping Plant at Callan Water Station.

neither were there any ravines, suitable for making reservoirs, and had there been, there was not sufficient rainfall to fill them in time for use; so, obviously, the next thing to do was to drill wells. This was done at several points, first at the station nearest midway between Brady and Menard. Here two wells were drilled—a shallow one, and a deep one (600 ft.). Then wells were drilled at the next stations both north and south, but none of them furnished enough water to justify the erection of a tank.

It was noted in traveling over the country that the large ranches were supplied with stock water furnished from comparatively shallow wells, with wind mills, and that these wells were in-




Plan of Water Station at Callan, Tex.; St. Louis & San Francisco.




Profile of Pipe Line at Callan Water Station.

variably located on the summits of rocky ridges. It was decided to profit by the experience of the ranch owners, and develop a supply along these lines.

The main divide separating the drainage areas of Brady creek and the San Saba river was crossed 1¾ miles south of the new town of Callan. On this summit three 8-in. wells were drilled, striking water about 120 ft. below surface, each furnishing about 10 gal. per minute. Over these wells wind mills were erected, pumping in to a galvanized iron reservoir tank 20 ft. in diameter and 6 ft. deep. From this reservoir tank a 3-in. pipe line leads to a 100,000 gal. tank erected at Callan at the foot of the grade 1.72 miles north of the wind mills. The latter tank is filled by gravity. The reservoir tank at the summit is on ground 2,082 ft. above sea level, while the top of the tank at the station is at elevation 2,044.

This arrangement has worked out very satisfactory, the supply being ample at all times for the requirements at that station; and the operating expense is nothing beyond the maintenance of the plant. The cost of the supply was:

| | |
|---|---|
| Drilling and casing 3 wells | $394.25 |
| Three wind mills, complete | 675.00 |
| Galvanized iron reservoir tank | 204.40 |
| Tank at station | 2,165.00 |
| Cost of pipe line, material and labor | 2,231.25 |
| | $5,669.90 |

The map, profile and photographs illustrate the plant clearly.

## CONCRETING IN COLD WEATHER.

A recent bulletin published by the information bureau of the Universal Portland Cement Company contains the following suggestions for concreting in cold weather:

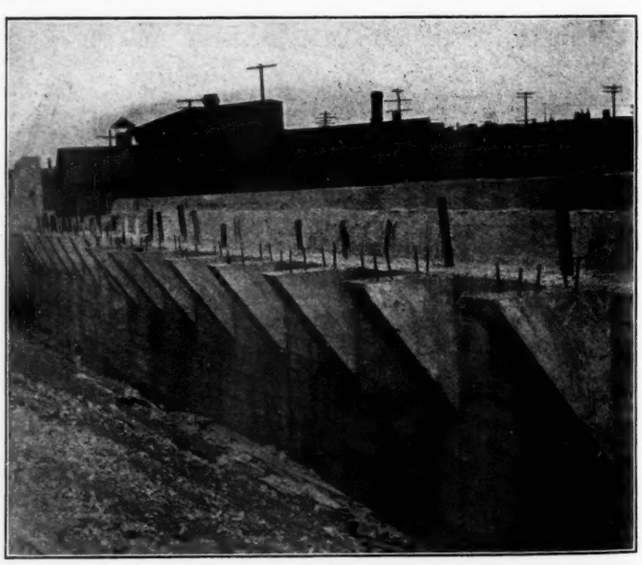
The results of tests made at the Watertown arsenal show that low temperatures practically suspend the hardening of concrete and that its strength increases very slowly under the influence of extreme cold. The same tests show, however, that the strength of concrete which has been frozen and which is thawed out slowly is only very slightly impaired. The longer concrete has been frozen the longer is the time required to overcome the action of the freezing. Since the effect of freezing is bad, precautions should always be taken to keep the aggregate and the mixing water heated and to protect the forms both before and after pouring. One of the most common methods of preventing freezing has been to use a small amount of salt in the mixing water. Even if salt is used, however, it is important that the aggregate be free from frost in order that the concrete may be properly mixed. If there is a possibility of electrolytic action the use of salt is to be discouraged, as it renders the concrete more susceptible to such action. In reinforced concrete there is also the danger that the salt will corrode the steel.

The materials for concrete may be heated in a variety of ways. Half cylinders of sheet steel are often set directly on the ground to form an arch, over which the sand and stone are piled and in which a fire is kept burning. A length of metal culvert pipe, with a piece of smaller pipe for a flue, serves the same purpose. Sections of old boilers have also been used. A portable heater can be made of sheet iron by providing a fire-box under a large pan for the sand and gravel, the whole framework being supported on wheels. The sand and stone may be piled directly on coils of pipe carrying steam, or the steam may be applied directly to a pile covered by tarpaulins. Short pieces of iron pipe attached to the boiler by lengths of hose are often inserted in piles of sand or gravel, allowing the steam to escape through the materials. An improved form of heater of this type has numerous small holes punched in the length of pipe, allowing the steam to escape at numerous points instead of from one large opening at the end of the pipe. With a good steam pressure this system is quite effective and avoids the rehandling of material. On large construction work storage bins provided with heating coils are often built. Mixing water may be heated by steam pipes in a water barrel or by fire in a furnace beneath a tank. Steam for heating the water may generally be supplied from the mixer boiler or, if necessary, from an extra boiler provided for that purpose. In cases where additional precautions are necessary to make certain that the concrete will leave the mixer unchilled, live steam can be turned into the drum of the mixer and the openings kept covered with canvas flaps. One contractor who was obliged to carry the concrete a considerable distance from the mixer burned a cupfull of gasolene in each empty concrete car before filling it, the sudden heat generated being sufficient to warm the metal of the car.

It is important to note in connection with any method of preventing concrete from freezing that heat is always produced in the hardening of concrete under normal conditions, that this heat is of value in the hardening process, and that the amount of heat developed is, within reasonable limits, in direct proportion to the temperature of the mass and its surroundings. The heat of the materials and the mixing water hastens to rise in temperature and increases it somewhat above that attained under normal conditions. Since the rise in temperature is decreased by an increase in the amount of water used, the least water compatible with good work should be used in mixing concrete in freezing weather in order that the maximum internal heat may be developed and the rate of hardening accelerated.

## SPECIAL DESIGN FOR RETAINING WALL.

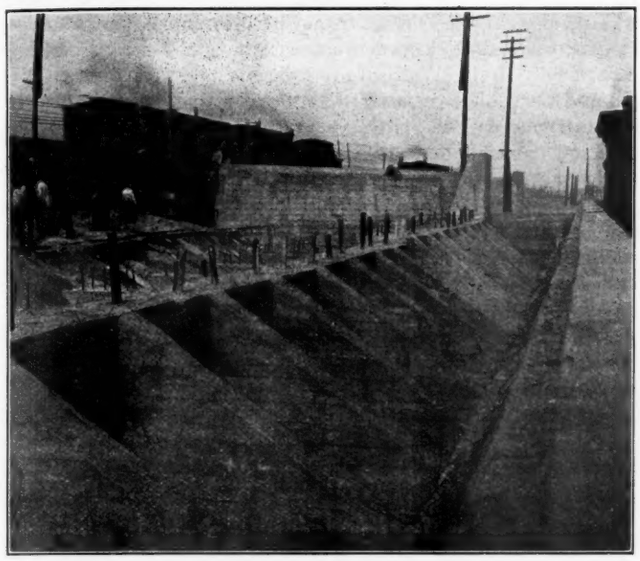
The Lake Shore & Michigan Southern is elevating its tracks through South Chicago, Ill., in connection with the work which is being carried on in the vicinity of Ninety-fifth street and South Chicago avenue to eliminate the grade crossing of the Lake Shore & Michigan Southern and the Pittsburgh, Fort Wayne & Chicago with the Chicago, Rock Island & Pacific, the Chicago & Western Indiana and the Baltimore & Ohio at that point. (See *Railway Age Gazette*, March 24, page 758.) To provide facilities for interchange between the Lake Shore on



**Lower Section of High Wall from High Track Side.**

the high level and the Rock Island on the low level, an interchange track is being built which, for a considerable distance, is parallel to and only 17 ft. from the nearest Lake Shore track. The grade of the Lake Shore is .3 per cent. ascending southbound and that of the interchange track 1 per cent. ascending northbound. To retain the embankment for the high level tracks and support the interchange track on the lower level, a special design of double retaining wall was adopted, which is illustrated herewith.

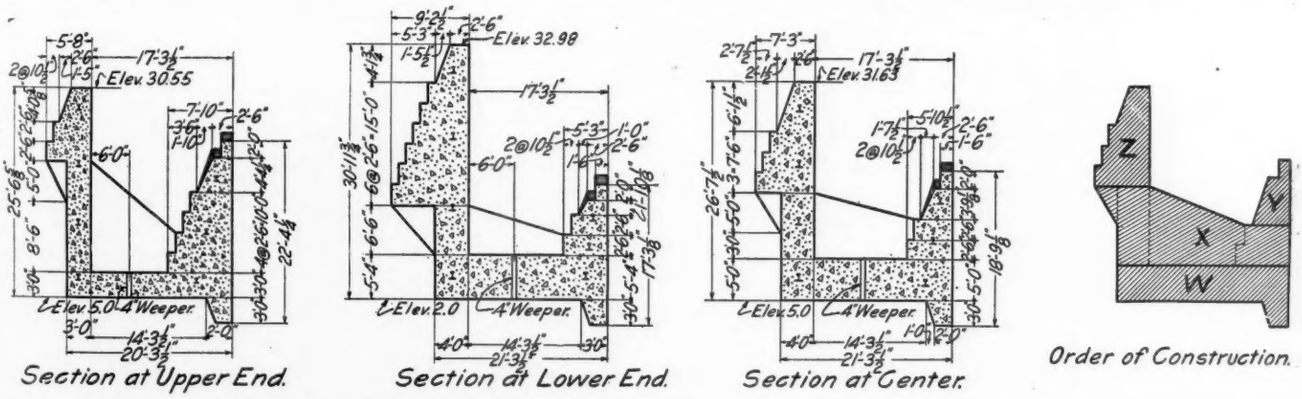
The essential features are the use of counterforts 2 ft. thick connecting the high and low walls and a continuous footing under both walls. This design is used for a distance of 893 ft., the difference in elevation of the tops of the walls being 6.19 ft. at one end and 16.72 ft. at the other end. At the upper end the counterforts are spaced 10 ft. center to center, and the section



**Counterforts Connecting High and Low Walls.**

of the high wall below the top of the counterforts is only 3 ft. thick. This spacing of counterforts is maintained for one-half the length of the wall, the thickness of 3 ft. being increased in increments of 3 in. at four sections in that distance. At the same points the thickness of the foundation, which is 3 ft. at the upper end, is increased in increments of 6 in. The counterforts on the lower half of the wall are spaced 7 ft. 6 in. center to center, the thickness of the section of the high wall below the top of the counterforts being reduced again to 3 ft. and of the foundation to 4 ft. at the center point. These dimensions are increased at four points in the remaining length, the increments being 3 in. for the wall thickness and 4 in. for the foundation. The only reinforcing used was old rails placed longitudinally in both walls, as shown in the drawing, and short lengths of corrugated bars used for bond between the sections of concrete, as shown in the photograph. Drainage was provided by placing a 4-in. weeper in each section between the counterforts.

The sequence of operations in building the wall is shown in the drawing. The foundation was placed first, then the counterforts, and then the upper sections of both walls, each section being built at one continuous operation. We are indebted to Samuel Rockwell, chief engineer of the Lake Shore & Michigan Southern, for the above information.




**Typical Sections, South Chicago, Retaining Wall; Lake Shore & Michigan Southern.**

## A VISUAL METHOD FOR DETERMINING THE PENETRATION OF INORGANIC SALTS IN TREATED WOOD.*

BY E. BATEMAN.

In the preservative treatment of wood with zinc chloride or other salts it is often desired to know the depth of penetration which has been attained in any particular charge or series of charges. The usual way of determining this is to analyze the wood for its zinc chloride content per inch from the perimeter to the center, a method both tedious and expensive. To obtain a simpler and cheaper method the following, which might be termed the visual method for the determination of the penetration of zinc chloride, has been devised.

It is a well-known fact that the ordinary salts of zinc are all either white or very pale in color, so that all chances of forming a colored salt with this metal are eliminated at the start. Several dyes of various natures have been added to the treating solution in the hope of fixing them in the wood to the same depth as the zinc chloride, but such methods have failed, either because the dyestuffs were insoluble in the treating solution or because they were precipitated on the outside of the wood. Advantage was finally taken of the decolorizing action of soluble zinc salts on uranium ferrocyanide. Zinc salts, in slight excess, will completely decompose the colored uranium ferrocyanide, with the formation of a white precipitate of zinc ferrocyanide. This property of zinc salts has been made the basis of a visual test.

A representative disk of the treated wood is cut as a test piece. The freshly cut surface is dipped for an instant in a 1 per cent. potassium ferrocyanide solution. The entire surface should be moistened, but the disk should not remain in the solution more than 10 seconds. After the disk has been thus moistened the excess of the solution is removed from the face by blotting paper. The moistened block is then dipped into a 1 per cent. solution of uranium acetate and allowed to dry. At first the whole block may have a reddish tinge, but on drying, the untreated portions will have a dark red or maroon color, while the treated portions will be slightly whiter than the natural wood.

On account of the color of the uranium ferrocyanide the test cannot be used on red oak, because the natural color of the wood masks that of the uranium compound.

In order to ascertain the accuracy of this method, a section of a pine tie which had been previously analyzed for its zinc chloride content in each inch from the perimeter was treated by the visual method. The analysis of the block is given in Table 1.

TABLE 1.—RESULT OF ANALYSIS OF A SECTION OF TIE FOR DETERMINING THE ABSORPTION OF ZINC CHLORIDE.

| Portion from which borings were taken. | Number of borings. | Zinc chloride found. *Lbs. per cu. ft.* |
|---|---|---|
| First inch | 8 | 0.77 |
| Second inch | 8 | .64 |
| Third inch | 8 | .28 |
| Fourth inch | 3 | .17 |

*From Circular 190, U. S. Dept. of Agriculture, Forest Service.

The wood adjacent to all of the outer eight holes shows zinc chloride, and by analysis contains an average of 0.77 lbs. of salt per cubic foot of wood. Four of the next eight holes are in the white (treated) wood, and the other four show only a partial treatment. The average absorption of these eight borings was 0.66 lbs. per cubic foot. Of the third eight holes only two are in the completely treated region, five are in partially treated wood, and one in a practically untreated spot. The average of the borings was 0.28 lbs. per cubic foot. The inner three holes all show partial treatment in the surrounding wood, and the analysis of the borings showed an absorption of 0.17 lbs. per cubic foot. It is therefore evident that the visual test is capable of detecting the presence of zinc chloride in treated wood when present in amounts as small as 0.17 lbs. of salt per cubic foot of wood, or, rounding off the second decimal, 0.2 lbs. per cubic foot.

Although zinc chloride is the principal inorganic salt used in the preservation of timber, yet several others have been and are used to a greater or less extent, among them mercuric chloride, copper sulphate, iron salts in various forms, etc. For such salts the same general method of testing the penetration may be applied as for zinc chloride, except that a double dipping process is unnecessary, since all the other common metals form some colored compounds which can be made to show their presence directly. In testing for copper, for instance, it would only be necessary to dip the section under examination in a solution of potassium ferrocyanide. The presence of copper would be shown by a dark red coloration in the treated zone. With salts of iron the same reagent would give a deep blue coloration in the treated zone.

When mercuric chloride is used as a preservative, the depth of penetration can be determined by treating the test disk with a solution of hydrogen sulphide, which can readily be prepared for this test by acidifying a solution of sodium sulphide. The penetration is indicated by a black precipitate of mercuric sulphide.

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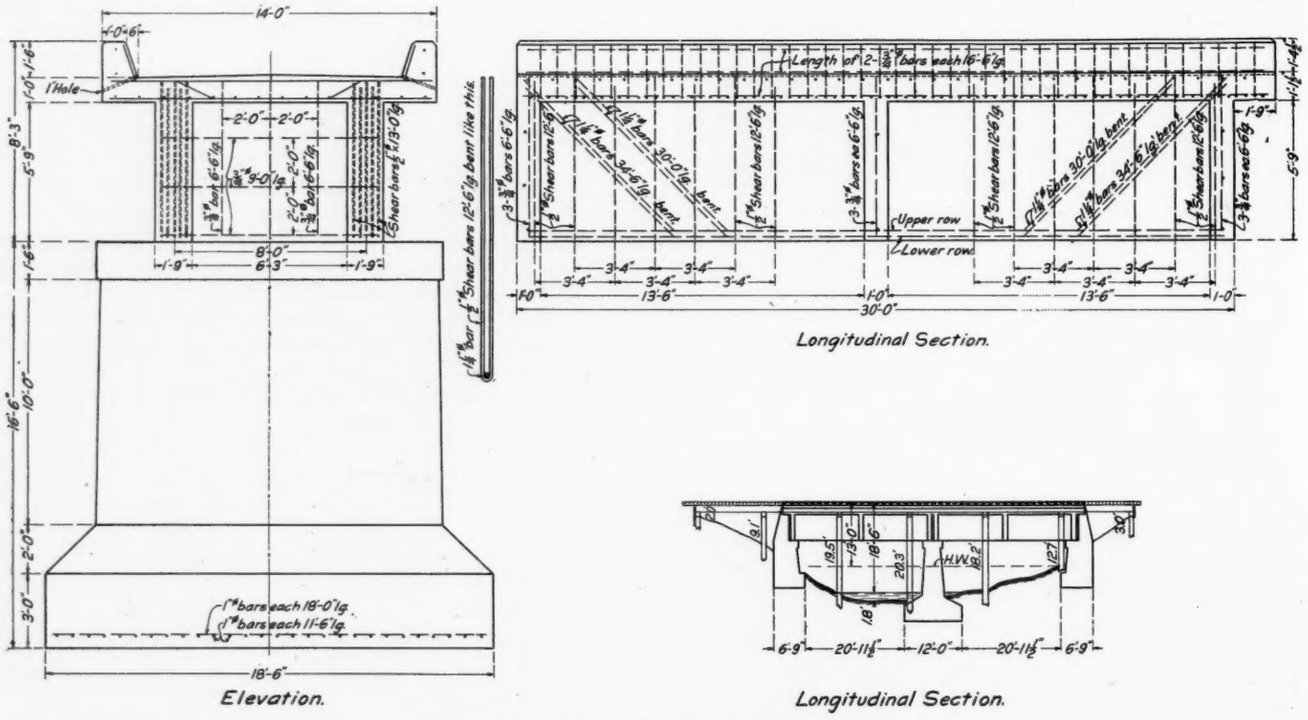
The work of four-tracking and regrading the South Yarra to Caulfield line, Victoria, at an estimated cost of $1,555,000, has been commenced. This work will take at least three year to complete.

## REINFORCED CONCRETE DECK GIRDERS ON THE WABASH.

While concrete decks have been placed on deck plate girders and the girders then moved into place, and while concrete through girders have been built in place, the building of concrete deck girders at one side and then sliding them into place is a new departure. The accompanying drawing shows the design of such concrete deck girders as worked out by the engineering department of the Wabash to replace a pile structure on the Pennsylvania division, near Johnsonville, Ind. These girders and the deck will be built as a monolith on false work at one side and moved into place in the same manner in which plate girders are handled after the concrete is allowed to set a sufficient length of time. While no trouble is anticipated in moving the structure into position, greater care will be required than in handling plate girders. The false work must be stronger and more rigid to withstand the load both during construction and while moving the girders into position, as the danger of injury in moving is greater with the concrete girders than with steel.




Concrete Deck Girder; Wabash Railroad.

The development of these plates and the construction will be watched with interest. We are indebted to A. O. Cunningham, chief engineer of the Wabash, for the plans for this structure.

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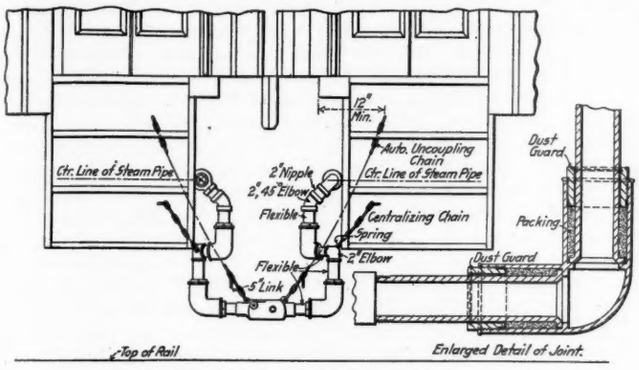
A system of railways is proposed in Argentina, so laid out as to form convenient junctions with the various lines of the Buenos Aires Great Southern at Guerrero, Las Flores, Azul and Bolivar, with the Buenos Aires & Western at Trenque Lanquen; and with the Buenos Aires & Pacific at Bragado and Junin. The new lines, which will amount to a total of about 640 miles, will traverse in places the rich lands recently drained by the great canals constructed by the provincial government of the province of Buenos Aires, and also the wheat-growing and cattle-raising camps along their entire distance. By this means the congestion of population and of traffic in and about Buenos Aires, which is rapidly becoming serious, will be relieved, while another outlet will be afforded for districts calculated to contain a population of 1,000,000 within the zone of country served by them, for at present there is a stretch of coast of some 700 miles south of Buenos Aires and La Plata without a deep-water port.

## GOETZ FLEXIBLE CONNECTOR FOR STEAM HEAT.

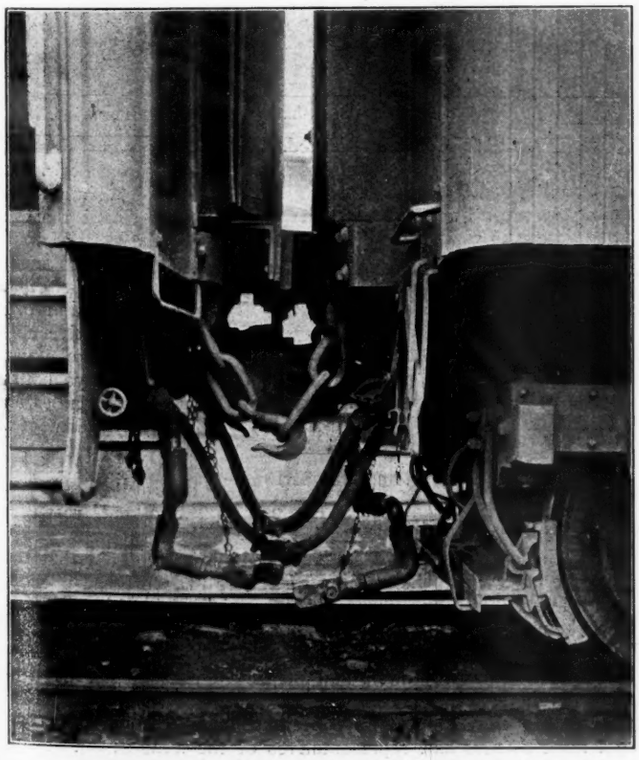
The rapid deterioration of steam hose for car heating is causing a demand for something more substantial and permanent; flexible metal connectors have been proposed and are used to a slight extent. The most familiar form is that which employs a ball joint, such as is used for engine and tender couplers and for the rear of some tenders where steam connection is made to the engine of the electric generator in the baggage car.

The flexible steam connector here illustrated is made of pipe




**Goetz Flexible Connector for Steam Heat.**

fittings and nipples, with two right-angle elbows which have long stuffing box connections in each arm. The sleeve which enters the elbow has a collar at the inner end, and is held in place by the packing and gland, as shown in the detail view. The movement of the sleeves in these packed elbows furnishes sufficient flexibility, and this is the new and special feature of the connection. The drawing shows the general arrangement with the steam connector so placed as not to interfere with the air or signal hose. It is supported and held in position by chains, and an auxiliary chain is attached to the standard hose coupling for the purpose of parting the coupling automatically when the cars are separated. This flexible connector is patented and is made and sold by the Joseph Goetz Manufacturing Company, Toledo, Ohio. It has been applied to cars on the Wheeling & Lake Erie, Ann Arbor, and Detroit and Mackinac railways, and is being tested by a number of other lines.

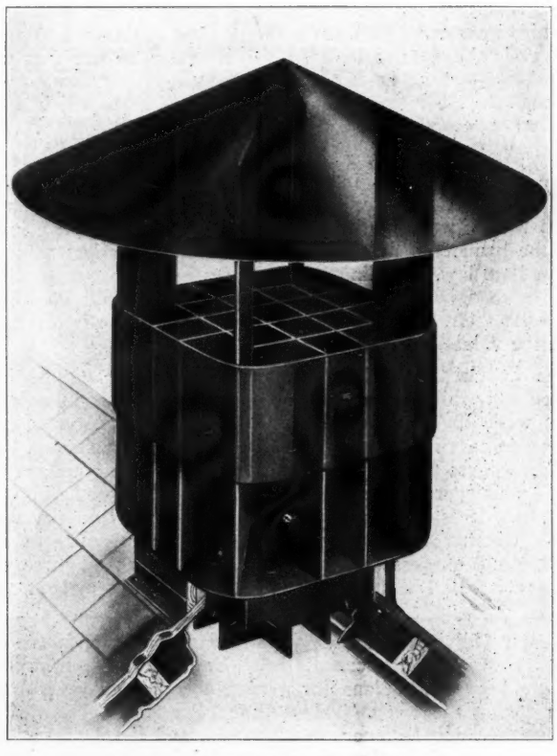


**Application of Goetz Flexible Connector for Steam Heat.**

## GARLAND VENTILATOR FOR BUILDINGS.

The Garland principle of ventilation, which has been used on many passenger cars for several years, is being employed in designing ventilators for shops, power houses, railway stations, freight houses and similar buildings; also for chimney tops and smoke jacks. Around the upper end of the main air shaft, which is divided into flues or air shafts, as shown in the illustration, is a series of auxiliary ducts, so arranged that they raise the cross air-currents and deflect their movement upward and across the corresponding series of flues in the main air shaft. The current of air flowing through the auxiliary ducts produces a positive induction action, always upward through the flues in the main air shaft, and from the interior of the building.

Back or down drafts are frequent in most ventilators which have been designed with the view of overcoming this very diffi-



**Garland Ventilator for Buildings.**

culty, and this action increases as the size of the ventilator becomes larger. The flow of air decreases in proportion to the increased area of the air shaft to such an extent as to make the upward currents so sluggish that the opposing air currents force their way down through the ventilator. The Garland ventilator has overcome this trouble in two ways: First, by dividing the main air shaft, which has an effect equivalent to the combination of several small ventilators into one large one, making the large single opening unnecessary; second, by the formation of a film of flowing air from the auxiliary ducts across the upper ends of the main air shaft flues.

The air shaft of the Garland ventilator being square instead of round, is easily applied to all kinds of buildings, skylights or smoke stacks; in many cases it can be applied without the use of an expensive and cumbersome base. These ventilators are made and sold by Burton W. Mudge & Company, Peoples Gas building, Chicago.

# General News Section.

The New Orleans Terminal Company has made an increase in the pay of its employees who are members of the brotherhood of trainmen.

The New York Public Service Commission has approved the revised plans of the Interborough Rapid Transit for its subways in New York.

The committee on interstate and foreign commerce of the lower house of Congress is understood to have decided to make a favorable report on the bill, introduced by representative Sims, of Tennessee, to abolish the commerce court.

Five sleeping cars on the Twentieth Century Limited, westbound, were derailed just outside of the Collinwood (Ohio) yard on March 7, by the breaking of a wheel. The cars struck a switch shanty near the track, killing a switchman who was inside.

Instead of carrying out the original plan of inviting representatives of the rail manufacturers to attend its meeting on March 20, the executive committee of the American Railway Association will hold its own meeting on that date, and will meet the rail makers in joint conference on the following day.

The report of the New York state commissioner of labor for the third quarter of 1911, gives the number of union laborers out of work in the state as 12,725, which is said to be less than at the corresponding time in any year since 1907. This number is 2.7 per cent. of the membership of the unions from which the reports were received.

The chairman of the house committee on interstate and foreign commerce has introduced in Congress a bill requiring the Interstate Commerce Commission to make physical valuation of all the railways in the country; to make a complete inquiry into the ownership of all railways and other carriers subject to the Federal law, including names of persons who own stock and who serve as directors; what were their original investments and what their present holdings. The commission is directed to have the valuations kept up to date.

The Continental Limited on the Wabash was derailed by a broken rail while rounding a curve on a 30-ft. embankment two miles west of West Lebanon, Ind., at 4:40 p. m. on March 7, and seven cars in the train rolled down the embankment, killing two passengers and a Pullman porter, and injuring a large number of passengers. The train was running at a speed of 35 miles an hour. It is uncertain whether the engine struck a broken rail or whether the rail broke under the engine. The mail car, baggage and express car, parlor car, day coach and three sleeping cars were all badly damaged, but the engine remained on the rails.

Cornell University alumni in attendance at the forthcoming meetings of the American Railway Engineering Association in Chicago have made plans for getting together on several occasions during the week. Tables have been reserved for Cornell men at the anuual dinner on March 20, and tickets may be obtained from H. C. Holloway of the Rail Joint Company, Chicago. The Cornell Alumni Association of Chicago will also hold a luncheon on Thursday, March 21, at the Grand Pacific Hotel, at 1 o'clock, it which addresses will be made by President F. S. Porter, J. G. Sullivan, assistant chief engineer of the Canadian Pacific, and Mr. Holloway.

It is announced that beginning with August 1, next, the passenger trains of the Lehigh Valley will run to and from Jersey City over the Central of New Jersey instead of over the Pennsylvania. Since the Pennsylvania has run its own through trains to the new station in Manhattan, the ferry service across the Hudson river from Jersey City has been diminished, the lines to Twenty-third street and to Brooklyn having been abandoned and the boats to Cortlandt street made less frequent. These changes are said to have proved somewhat detrimental to the Lehigh Valley. The Lehigh Valley already has a freight terminus adjacent to the station of the Central of New Jersey. Its line connects with the Pennsylvania at Newark, about 10 miles from New York, and also at Metuchen; and with the Central of New Jersey at several places within a few miles of New York.

In the hearing before the Stanley Congressional committee at Washington this week, G. M. Freer gave figures tending to show that on shipments of steel from Chicago to Kansas City the Elgin, Joliet & Eastern, the originating road, received an exorbitant share of the through rate ($2.75 a ton), the road being controlled by the United States Steel Corporation; and that the Kansas City Southern, on rails consigned to itself, for use in its own tracks, also received an undue share. It does not appear that any official or documentary evidence was presented to substantiate these statements. Statements were also made to the effect that the Bessemer & Lake Erie, which is controlled by steel interests, received an undue share of a through rate on freight carried between Pittsburgh and Buffalo. Testimony was also given tending to show that the Duluth, Missabe & Northern made excessive profits on the transportation of iron ore. On Wednesday of this week Joseph Wood, vice-president of the Pennsylvania lines west of Pittsburgh, appeared before the committee. Asked if it was fair to the public that a short railway, which is a mere facility of a manufacturing plant, should have the privileges and rights of a common carrier, he replied in the negative. Mr. Wood said that the Pennsylvania Railroad acquired control of the Pennsylvania Steel Company and the Cambria Steel Company, because it was feared that the United States Steel Corporation would raise the price of rails.

Some figures showing the amount of work involved in caring for the linen used on the dining cars of a large railway system recently have been compiled by the Southern Pacific. An average of 315,000 pieces of linen are laundered each month in this department, including 100,000 napkins, 100,000 dish towels, and 40,000 table cloths, and each piece is carefully looked over by inspectors to detect tears or signs of wear. At the commissary department at Oakland, Cal., there is maintained a linen repair room where thousands of napkins, table cloths, dish towels and cooks' and waiters' aprons are kept in perfect condition. Fourteen electrically-operated sewing machines are kept running steadily eight hours a day and six days a week. With these machines it is said that a hole in a piece of table linen can be darned so well that it is sometimes impossible to detect the stitches from the original weave. Each piece of linen as it is brought in from a trip is counted and careful count and inspection are continued until it is returned. In employing women for this work the Southern Pacific gives preference to dependent relatives of men who have been injured or killed in the service.

### Twentieth Century Limited Derailed.

The Twentieth Century Limited, of the New York Central, eastbound, was derailed near Hyde Park, N. Y., five miles north of Poughkeepsie, on the morning of March 13. A rail broke under the second car, derailing one of its trucks. This car broke away from the car ahead of it, but remained on the right of way, while the five following cars went down the low embankment into the Hudson river, the thick ice supporting them so that they were only partially submerged. The locomotive and one car stayed on the track. Twenty-two passengers and five employees were injured, a few seriously. The rail which broke was 100-lb. section, rolled in 1910. The train, which was two hours late, is believed to have been running at from 45 to 50 miles an hour. The cars, which are all-steel, were but slightly damaged.

### The Coal Strikes.

The industrial situation in England and Scotland, resulting from the strike of coal miners, has continued to grow worse during the past week, and on Tuesday it was reported that the stoppage of work by the million of miners had enforced idleness on at least a million persons in other industries, these industries being compelled to close, or to discontinue important branches of their work, on account of the scarcity of coal. The Northeastern Railway alone had suspended 1,369 trains. A situation tending towards a complete deadlock was relieved on Tuesday by the convening of a conference of government officers, coal mine owners and representatives of the miners; but at last accounts this conference had brought forth no definite results.

The most talked of remedial measure is a proposition for an act of Parliament establishing minimum wages for miners. It is said that the men representing the laborers throughout the Kingdom have come to the conclusion that such a law, if passed, might be enforced contrary to the desires of the workers. If the government should decide what constitutes a minimum wage it would also force the workers in the industry to which it applied to accept. The result of this would be compulsory arbitration, to which a majority of the labor leaders are opposed. Widespread inconvenience and privation have been caused by the strike. Reports from Glasgow declare that entire cities in Scotland are without food and fuel.

Press despatches from Germany on Saturday last, reported extensive strikes of coal miners in the Westphalian coal fields, and on Tuesday it was said that at least 200,000 men had left their work in that district. Disorders, calling for interference of the police, occurred at many places in Prussia.

The committee representing the anthracite coal operators of Pennsylvania met in New York on Tuesday of this week and prepared the reply which they were to give to the representatives of the workmen in the anthracite mines, who have asked for an increase of 20 per cent. in their wages besides radical changes in the conditions of their employment. The operators refuse substantially all of the demands made by their employees. The committee proposes that the present arrangement be continued for three years longer (the miners had proposed a one year agreement). To grant the miners' demands would necessitate an increase of 67 cents a ton in the market price of the domestic sizes of coal. An advance could not be made unless the selling price could be increased, for the cost of mining has been increased in recent years because of the exhaustion of the thicker veins and from other causes. Extended reference is made to the agreement of 1903, setting forth the good results of that agreement.

It is said that the quantities of anthracite coal in storage are about the same as usual at this time of year. In anticipation of a possible strike this spring, the companies had mined more coal than usual, but the extra product is understood to have been nearly or quite all absorbed by reason of the increase in the demands of consumers because of the unusually cold weather of the past three months.

### Good Roads.

The Department of Agriculture reports that Indiana leads all the States of the Union in mileage of improved roads. The eight leading good roads states, as shown by the data compiled by the director of the office of public roads, are as follows:

| | Mileage Improved. | |
|---|---|---|
| | 1909. | 1904. |
| Indiana | 24,955 | 23,877 |
| Ohio | 24,106 | 23,460 |
| New York | 12,787 | 5,876 |
| Wisconsin | 10,167 | 10,633 |
| Kentucky | 10,114 | 9,486 |
| Illinois | 8,914 | 7,924 |
| California | 8,587 | 8,803 |
| Massachusetts | 8,463 | 7,843 |

Where decreases are shown, they have been the result of reclassification. New York is the only one of the eight that appears in the list of the eleven states leading in actual progress in road building in the 5-year period. In other words, while the entire eight states maintain their lead, it is merely because of their earlier start, and New York alone is entitled to a place in the list of states making progress in the last five years. The gain in New York is due largely to the fact that the state has bonded itself for $50,000,000, and that $5,000,000 a year or more is being expended by the state, in addition to an equal sum by the counties, in building state highways. New York is leading all the states in actual progress at the present time.

### A Strike Sequel.

The Texas railway commission has received a most extraordinary petition signed by S. W. Steele, chairman of a general commitee of blacksmiths, boilermakers, machinists, coppersmiths and carmen, protesting against an application of the Houston & Texas Central, which the committee believes is to be presented, for permission to issue bonds for the purpose of purchasing 50 or more locomotives. The craftsmen's petition makes no reference to the strike of mechanical department employees on the Harriman lines, but states that there are at present in Texas many idle mechanics seeking and needing employment, and that it would be more economical for the company to properly repair its present engines than to purchase new. The petition also states that the company is now employing unskilled non-resident instead of skilled mechanics, as formerly, and a much larger number than would be necessary if skilled mechanics were employed; and that the employment of non-resident labor entails on the company a greater expense than would be required to pay the skilled home labor for the same service.

### The Han-Yang Iron and Steel Works.

The following is abstracted from an article in the Quarterly of the School of Mines, Columbia University:

The Han-Yeh-Ping Iron & Coal Company, China, which was established in 1891, has three chief plants; the Han-Yang iron and steel works, on the northern bank of the Yang-Tse river, being separated from Hankow by the Han river and from Wu-Chang by the Yang-Tse river; the Ta-Yeh iron mines and limestone quarry, about 30 miles south of Hankow, near the Yang-Tse river; and the Ping-Hsiang coal mine and coking plant, about 250 miles south of Han-Yang, not far from the Hsiang river. The coal mine is four miles southeast of the city of Ping-Hsiang.

The iron works comprise three modern blast furnaces and produce about 500 tons of pig iron a day, or 180,000 tons a year. About two-thirds of the pig iron produced goes to the steel plant to be made into railway material. A small portion is used in the foundry and some is sold to the native works of the surrounding cities. The rest of the pig iron is exported to Japan and the United States.

The steel plant consists of six Siemens-Martin open hearth furnaces, one mixing furnace, a cogging mill, a beam and angle mill, a rail mill, a plate mill and other plants capable of rolling 1,000 tons of finished steel a day. At present the output is about 300 tons a day.

The approximate cost of producing iron ore in the open cut workings at Ta-Yeh is as follows: Stripping, $0.04 per ton; mining, $0.09 per ton; tramming, $0.02 per ton; powder, steel, etc., $0.01 per ton; superintendence, $0.03 per ton; loading cars, freight to the Yang-Tse, etc., $0.15 per ton; total, $0.34 per ton.

The output at Ta-Yeh is 1,600 tons daily, or about 500,000 tons a year. Of this, 125,000 tons is exported to Japan every year. At the present rate of output, the ore in sight will last about 70 years; the amount at greater depths is not known. The present output of the Ping-Hsiang coal mine and coking plant is 600,000 tons a year, which is expected to increase to 1,000,000. It is estimated that there are about 300,000,000 tons in this field, which should last about 200 years.

The wages of the laborers at the iron and coal mines are as follows: Miners, $0.13 to $0.15 per day; tipple coolies, $0.05 to $0.06 per day; loaders and pushers, $0.05 to $0.07 per day. The wages of laborers at the steel works are as follows: Rollers on mills, $0.17 to $0.35 per day; heaters on furnace and open hearth smelters, $0.27 per day; helpers, $0.17 to $0.25 per day; blacksmiths, $0.35 to $0.50 per day.

### Good Results of Government Conciliation.

We can be certain, for the tendency is unmistakable, that more and more will the influence and authority of the government be extended into business pursuits which have hitherto been conducted as purely private enterprises. Broadly speaking, there are already three parties concerned in every labor dispute, the employer, the employee and the public. Unquestionably, the relative interest of the public in these contentions will increase, and some plan must be devised to protect that interest without injustice to either of the other parties concerned.

That section of the Erdman law which provides for federal mediation in disputes between interstate carriers and their employees, when the public welfare was threatened, has produced excellent results. If the efforts of the government representatives at conciliation fail, they may then press arbitration on the warring elements.

The arbitration features of the law are undoubtedly useful, however infrequently brought into play, but the scheme of mediation has been a distinct success. It has been utilized in numerous cases during the past six years, and in no instance yet has a strike followed the intervention of the mediators. The law may, therefore, be regarded as at least a promising and suggestive innovation.

Labor unions are the natural outgrowth of business and commercial conditions. Less than eighty years ago there was seldom to be found more than a few score employees under one employer. Today, with concentration of industry, so that thousands and tens of thousands are under one directing head, the necessary. Labor disputes cannot be adjudicated properly in the regular courts of law. A lawsuit does not look forward, it usually looks backward. But a labor controversy does not ordinarily relate to what has happened, it relates, rather, to what is going to happen. It looks to the future, to the wages to be paid, to the hours of labor to be required, to the conditions of service which shall thereafter obtain. The plan of mediation contemplates that official assistance which will aid the parties themselves to compose their difficulties and reach an amicable understanding. For this reason, it has been the conception of those who have acted in this capacity (Messrs. Knapp and Neill) that their duty is not to determine what settlement they think ought to be made, but to find out what settlement can be made.

Suits at law leave the litigants enemies thereafter, for the victorious one holds that he has been put to expense to vindicate his right, while the loser invariably feels that there has been a miscarriage of justice. This is not the case with the mediation or arbitration plan.—*Judge M. A. Knapp, before National Civic Federation.*

### A Man Capitalized.

In a statement issued to the employees of the road, President H. U. Mudge, of the Chicago, Rock Island & Pacific, capitalizes each man earning $83.33 a month, or $1,000 a year, at $25,000, because the man's wages or salary is the interest at 4 per cent. on $25,000. He says a man earning that much is worth as much as a locomotive costs, but he adds:

"You can make yourself worth more, while a locomotive cannot. You can direct your own energies, while a locomotive must be directed by a driver. It rests with you to raise your own capitalization to $50,000, to $100,000, or even to $500,000. Therefore be careful about your food, treat your body decently, and, above all, feed your mind. You are working for a large corporation. In the nature of things it cannot know you very well personally, but it knows you by the work you turn out. It sets a real value on your work, higher than you think. Your value is measured by the quality and quantity of results you produce. Somebody knows your actual worth, appreciates your honest endeavors and has you in mind for better things. It is a business proposition. Each of us is capitalized."

### New Passenger Service to Pacific Coast.

Several important changes in through passenger train service from Chicago to the Pacific coast are being planned to take effect about May 1, although all arrangements have not been completed. The Chicago & North Western, in conjunction with the Union Pacific and Southern Pacific, will put in service a complete new five-car train, all-steel, now being built by the Pullman Company, to run from Chicago to San Francisco in 63 hours and 55 minutes, leaving Chicago at 7:15 p. m., and arriving at San Francisco at 9:10 a. m. the third day. This is a reduction of nearly four hours from the present schedule. The train will take the place of the present San Francisco Overland Limited, and the former name, the Overland Limited, will be restored. An extra fare of $10 will be charged.

The Chicago, Milwaukee & St. Paul, whose Overland train has heretofore been consolidated with that of the North Western after reaching Omaha, will have an exclusive through train from Chicago in connection with the Union Pacific and Southern Pacific, with cars for Los Angeles, San Francisco and Portland. The schedule for this has not yet been determined. The North Western and St. Paul probably also will each have exclusive trains from Chicago to Denver via the Union Pacific in place of the trains which are now consolidated after reaching Omaha.

### Increased Pay.

The Bureau of Railway Economics, Washington, D. C., reports that there were substantial increases in the wages of railway employees during the fiscal year 1911. Reports filed with the Interstate Commerce Commission show that the total compensation to the employees of railways over 500 miles long was $1,005,277,249. This sum was greater by $41,868,822 than it would have been at the rates of pay in effect during 1910, and greater by $69,297,678 than it would have been at the rates of pay in effect during 1909.

Notwithstanding an increase of 2,108 in the miles of railway operated, there were fewer employees on the payrolls June 30, 1911, than on June 30, 1910, by 31,037, yet the total compensation paid to employees during 1911 was greater than that paid during 1910 by $49,976,216. This is greater than the increase in the gross earnings of the railways by $22,595,121. Net revenues fell off by $40,988,539 during the same period in which compensation increased nearly fifty millions.

The summary of revenues and expenses of the steam railways over fifty miles in length for the month of December, just issued by this bureau, shows that for the calendar year 1911 the total operating revenues were less than for the calendar year 1910 by $27,698,780, and the net revenues less by $22,286,784.

### The Steel Corporation's Unfilled Tonnage Report.

The unfilled tonnage report of the United States Steel Corporation shows that on February 29 there were 5,454,200 tons compared with 5,379,721 tons at the end of January. This is an increase of 74,479 tons. New orders during February exceeded shipments by 2,568 tons a day. The daily average of new orders received in January was a little over 37,700 tons, and the daily average in February was 31,034 tons. Shipments in February were about 50,000 tons less than in January, but the average daily shipments were greater in February than in the preceding month.

### The Aviators.

Flying from London to Paris on Thursday, March 7, Henri Selmet traversed the distance between those cities, 222 miles, without a stop in two hours, 57 minutes, or at the rate of about 75 miles an hour. The aviator flew at an average height of more than a mile. Most of the time he was above the clouds, and directed his course by means of a compass. He was helped along by a strong breeze; and in the afternoon, when he attempted to make the return journey, was forced to give it up and land near Dieppe on account of the force of the wind. Mr. Selmet said that he used his air ship on this trip because, on account of the strike of coal miners in England, railway traffic was uncertain, and it was important for him to be in Paris that day.

This, probably, is the best time ever made by a human being for that distance, though the steam railway locomotives of the Pennsylvania Lines, on October 24, 1905, accomplished nearly the same rate, namely, 74.55 miles an hour for 257 miles.

But scarcely had Mr. Selmet's feat been published when the press despatches reported that Maurice Tabuteau, a French aviator, who already had broken many records, had flown in a monoplane from Pau to Portiers, France (on Monday, March 11), 261 miles, in two hours, 35 minutes, or at the rate of over 101 miles an hour. At this rate the journey from New York to Chicago would take only about one-half the time required by the famous 18-hour trains; and the clocks—an hour apart—would reduce the journey to apparently eight hours.

### A Link with the Past.

John Hance, who was fireman of the special train from Philadelphia to Trenton, which carried the news of the death of President Zachary Taylor in 1850, died recently at his home in West Point Pleasant, N. J., at the age of 87. And that was the way in which important news was carried in 1850, six years after Morse demonstrated his telegraph between Washington and Baltimore.

### Grievance Committee, Latest Style.

A few weeks ago the division superintendent of one of the large trunk lines suspended an engineman for three months for running past signals. The engineman was a prominent member

of his small community, and the Ladies' Club took the matter up and endeavored to secure his reinstatement. They went to the superintendent; but, receiving no satisfaction, the president of the club took the matter up with the president of the road. He looked the matter up and soon wrote: " . . . I find that this is his fourth offense. If this had been kept up much longer he might have wrecked his train. Unless my attention had been called to this I fear he would have been reinstated by the equally culpable superintendent at the end of his suspension period. Inas-much as we want no men on our road who cannot obey orders, I have issued instructions that Mr. ——— must never again be employed by this company under any circumstances. . . . I have also discharged the superintendent.—*Wall Street Journal.*

### Illinois Central Educational Bureau to Assist Employees in Legal Matters.

D. C. Buell, chief of the educational bureau of the Illinois Central, has issued a circular to employees announcing that the bureau is now in a position to assist employees in legal matters to a certain extent. It will endeavor to issue from time to time pamphlets for general distribution or to publish articles in the company's employees' magazine dealing with matters wherein experience has shown that for want of legal aid employees have been imposed upon so that they have suffered either financial loss or worry or unpleasantness which could have been avoided had they known their legal rights. The circular states that it is the desire of the management to safeguard employees as much as possible and to make each employee feel that the company has a personal interest in his welfare and progress. The bureau has already afforded a means whereby employees may better inform themselves about their work, and is now taking steps to assist in the prevention of accidents by means of explanatory lessons and later by means of moving pictures to illustrate right and wrong methods. The circular continues:

"The first step that the bureau will take will be to explain the methods of loan sharks—to tell employees who have suffered from the wiles of these sharks what their rights are, and to offer employees who are at present in trouble as a result of having patronized these loan sharks or companies, aid in straightening out their affairs and getting clear of the clutches of those engaged in the illegal practices by means of which the loan sharks exist.

"While the rules of the company as regard garnisheeing, etc., stand as they have heretofore, nevertheless, any employee of the company may feel free to write to the chief of the educational bureau regarding any complications that he may have gotten into, due to obtaining a salary loan from one of these moneylenders.

"The object in doing this is purely a friendly one. Such employees as are in any trouble of this kind will be protected as far as their position is concerned; their cases will, as far as possible, be handled in confidence, and their record will remain unaffected. The company feels that if it can aid any of its employees in this manner it will be well repaid in better and more loyal service, by having helped to remove such a cause of worry and possible temptation.

"This offer of the educational bureau carries behind it the backing of all of the organization and talent of the company's law department. While it cannot as yet be stated how far the educational bureau will be able to go in offering legal aid to employees, nevertheless it suggests that any employee who at the present time needs legal advice, information, or aid, of any kind (this offer not being confined to loan shark cases), present his case to the educational bureau. This will enable the bureau to find out just what the employees need that it can provide in the way of aid, and may result in the bureau being able to do considerable good even before it can announce the complete plan it hopes to put into effect."

### Forestry Conference.

There will be a forestry conference in connection with the Nashville, Tenn., meeting of the Southern Commercial Congress, April 8-10. H. S. Graves, forester of the United States Department of Agriculture, will preside over this conference. The conference will consist of two sessions, the first of which will be held in the afternoon of April 8. At this session there will be a discussion on Losses Suffered in the South Through Forest Fires; The Possibility of Control; What the Timberland Owner and Lumberman Can and Should Do to Prevent Fire Losses, and How Far Conservative Cutting Will Be Practicable for Protection from the Fire Is Assured. The second session of the conference will be held in the morning of April 9, at which there will be a discussion on The State Forestry Laws; Fire Organization; Need of Uniform Legislation, and the Cooperation of State and Private Owners with the Federal Government Under the Weeks Law.

### Association of Railway Telegraph Superintendents.

A joint meeting of the eastern and western divisions of the Association of Railway Telegraph Superintendents will be held in the Assembly Room of the Chicago & North Western, at Chicago, on Wednesday, March 20, at 10 a. m., for a general discussion of matters of mutual interest. Among the subjects to be taken up will be the date for holding the annual convention, which will doubtless be changed, owing to the political conventions that conflict with the date originally set.

### New York Railroad Club.

At the annual electrical meeting of the New York Railroad Club, to be held March 15, W. J. Harahan, chairman of the committee on electrification, will make a statement in that committee's behalf, following which there will be brief addresses by George Gibbs, William McClellan, W. S. Murray, E. B. Katte, Frank J. Sprague and C. O. Mailloux. Others have been invited, and may participate, including W. B. Potter, B. F. Wood, N. W. Storer and B. G. Lamme.

### Cleveland Engineering Society.

At the regular meeting of the Cleveland Engineering Society, which was held March 12, an illustrated paper on Safety as Applied to Engineering was presented by C. Eugene Pittibone, safety inspector of Pickands, Mather & Company.

## MEETINGS AND CONVENTIONS.

*The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.*

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.; annual, May 7-10, Richmond, Va.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Boston, Mass.; annual, May 10-11, San Francisco, Cal.

AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, New York; next convention, Seattle, Wash.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Detroit, Mich.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September; annual, March 17, Chicago.

AMERICAN ELECTRIC RAILWAY ASSOCIATION—H. C. Donecker, 29 W. 39th St., New York. Convention, October 7-11, Chicago.

AMERICAN ELECTRICAL RAILWAY MANUFACTURERS' ASSOC.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next session, May 15, New York.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, Monadnock Block, Chicago; annual convention, March 19-21, 1912, Chicago.

AMERICAN RAILWAY MASTER MECHANICS' ASSOC.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—M. H. Bray, N. Y. N. H. & H., New Haven, Conn. Convention, July 9, Chicago.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa. Annual, March 28-29, New York.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 22, 1912, Los Angeles, Cal.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

Association of Transportation and Car Accounting Officers.—G. P. Conrad, 75 Church St., New York. Convention, Oct. 7-11, Chicago.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va.; annual, May 15, Buffalo, N. Y.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, rue de Louvain, 11 Brussels; 1915, Berlin.

International Railway Fuel Association.—D. B. Sebastian, La Salle St. Station, Chicago. Convention, May 22-25, Chicago.

International Railway General Foremen's Association.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York; annual convention, May 14-17, Pittsburgh, Pa.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

Master Car and Locomotive Painters' Assoc. of U. S. and Canada.—A. P. Dane, B. & M., Reading, Mass. Convention, September 10-13, Denver, Col.

National Railway Appliances Assoc.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railroad Club.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

Omaha Railway Club.—H. H. Maulick, Barker Block, Omaha, Neb.; second Wednesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Business Association.—Frank W. Noxon, 2 Rector St., New York.

Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Electrical Supply Manufacturers' Assoc.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

Railway Gardening Association.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.

Railway Industrial Association.—G. L. Stewart, St. L. S. W. Ry., St. Louis, Mo.; annual, May 12, 1912, Kansas City, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa. Next meeting, March 18, Chicago.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio. Convention, May 20-22, Buffalo, N. Y.

Railway Supply Manufacturers' Assoc.—J. D. Conway, 2135 Oliver Bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.

Railway Tel. & Tel. Appliance Assoc.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. Y., Sterling; September, 1912, Buffalo, N. Y.

St. Louis Railway Club.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

Society of Railway Financial Officers.—C. Nyquist, La Salle St. Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; August, 1912.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

# Traffic News.

The Pennsylvania is to run an agricultural instruction train over its main line in Pennsylvania during seven days, beginning March 22.

The Northern Pacific has established a western immigration and industrial agency, with headquarters at Spokane, Wash., under the direction of Charles E. Arney.

It is announced that the lake steamers of the Canadian Pacific will hereafter make their eastern terminus at Port McNicoll, on Georgian Bay, instead of Owen Sound. Of the five steamers of the company, one only will call at Owen Sound.

Through freight service from Chicago to New Orleans was established on March 1 by the St. Louis & San Francisco in connection with the Louisville & Nashville, New Orleans, Mobile & Chicago and New Orleans & North Eastern, the distance being 1,015 miles.

The shipments of anthracite coal by the Philadelphia & Reading during the month of February were the heaviest in the history of the company, aggregating 784,000 tons. It is said that coal trains were despatched from the yard at Pottsville every half hour during the month.

Railway men of Portland, Ore., have organized the Portland Transportation Club with the following officers: President, L. F. Knowlton, city passenger agent Spokane, Portland & Seattle; secretary-treasurer, E. M. Burns, general agent, freight department, Chicago Great Western.

On Sunday, March 10, the Chicago & North Western train No. 5, which heretofore has left Chicago at 8:30 a. m. for Omaha, was consolidated with No. 13, which formerly left at 10:00 a. m. for Denver and the Puget Sound, and will hereafter leave at 9:30 a. m. The opposite trains were also consolidated, leaving Omaha at 6:35 p. m., and arriving at Chicago at 8:30 a. m.

Rate clerks of the Western Passenger Association have been engaged for some time in working out a readjustment of interstate passenger fares affected by the Minnesota state rates which were recently advanced from 2 cents to 3 cents a mile following Judge Sanborn's decision holding the state law unconstitutional. It is intended to advance the interstate fares about May 1.

The Lumbermen's Club of Memphis, through C. D. Hendrickson, chairman of the river and rail committee, is seeking to establish a separate freight department in that organization. They contemplate seeking an adjustment of rates on lumber into and out of Memphis. It is claimed by them that present classification sheets show discriminating rates against Memphis as a shipping point for lumber.

The agricultural department of the state of Tennessee is preparing to run instruction trains on railways in all parts of the state during the months of July, August and September, next. Widespread interest was manifested in what was done by the department in this line last year. The plans now being made include provisions for displays from the Educational and the Health departments of the state government.

It is estimated that the California lemon crop this year will be one of the largest since the culture of that fruit was begun in the state. The minimum estimate up to date is 5,000 carloads. During January and February 1,341 carloads were shipped. Last year's crop was 6,764 carloads. The usual loss to the lemon crop on account of frost was very small this season. During the last five years 26,208 carloads of lemons have been shipped out of California over the lines of the Southern Pacific alone.

The Denver & Rio Grande, in connection with the Utah Agricultural College, ran a "farmers' special" train over its lines in Utah from February 20 to March 12. Stops of about half a day each were made at stations in the agricultural section, and lectures were given on such subjects as dairy cows, dairying opportunities, stock-raising, stock judging, horticulture, the planting of apple and peach orchards, drainage, sanitation, dry-farming and domestic science. This is the second agricultural demonstration train to be run over the Denver & Rio Grande lines in Utah.

The foreign trade committee of the Chicago Association of Commerce has addressed resolutions to the senate committee on interoceanic canals and the house committee on interstate and foreign commerce, advocating that reasonable tolls be imposed on all vessels passing through the Panama canal, having in mind the competition of the Suez canal; that at present no discrimination of any nature between American vessels whether engaged in coastwise or foreign trade and vessels of any other nations shall exist; that no discrimination in tolls be imposed on vessels engaged in coastwise trade by reason of ownership; and that all vessels engaged in coastwise trade be subject to regulation by the Interstate Commerce Commission.

The Merchants' Association of New York has issued a report advocating a law providing for the passage of coastwise shipping through the Panama canal free of toll. "If," says the association, "our purely domestic, or coastwise, shipping is not involved in our treaty obligations to foreign countries, and therefore is subject only to internal regulation, it should be as exempt from tolls when using the Panama canal as when using the Soo canal, the Port Eads passes of the Mississippi, or any other public improvement belonging to the United States. If the tolls are to be charged in one case, why not in all cases? Why not for using the great Ambrose Channel of the port of New York? In the latter case, if on domestic, why not on foreign shipping?"

E. E. Mote, manager of the Pacific Car Demurrage Bureau, San Francisco, has issued his comparative statement for the month of January showing the benefit derived from a high demurrage rate. In the state of California cars are now charged for at $3 a day as compared with $6 a day during the 22 months ending with April, 1911, and with a rate of $1 a day which is charged on cars used in interstate traffic. Comparing with January three years ago, when the rate on all cars was $1, Mr. Mote finds that if the same percentage of cars had been held over time now as then the aggregate delays would have been 30,434 days instead of 2,706 days, and the demurrage would be $30,434 instead of $8,118. The saving—$22,323—Mr. Mote thinks amply justifies the imposition of a high demurrage rate; and in one sense it is not high; it is no greater than what a car will earn if used in moving freight.

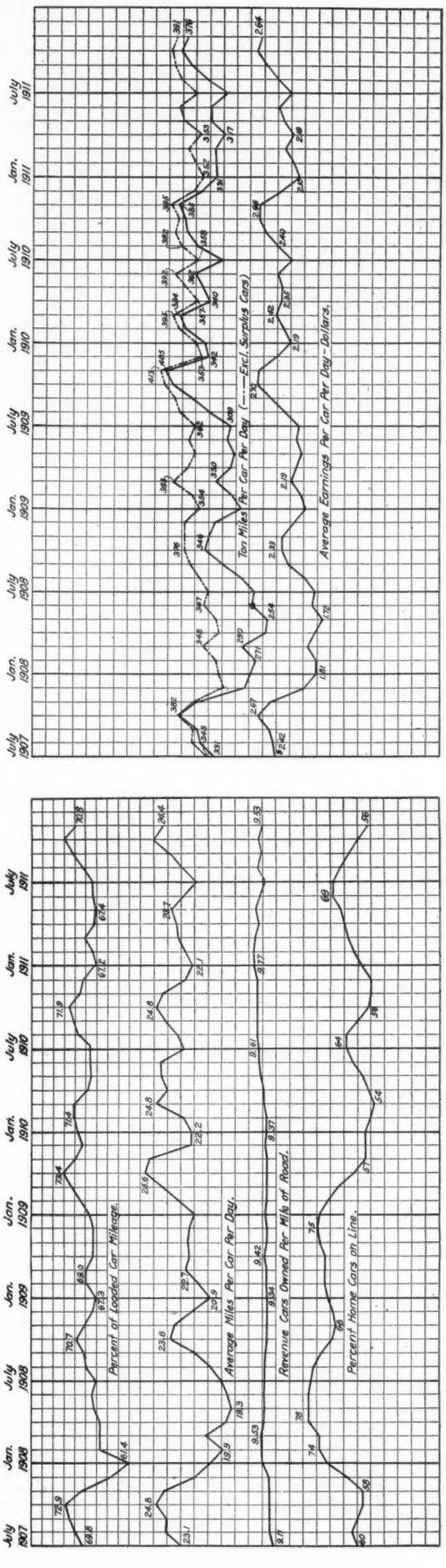
The Department of Electrical Engineering of the Massachusetts Institute of Technology is investigating the adaptability of electric vehicles for trucking purposes, more especially with reference to the conditions in Boston and its vicinity. The inquiry covers cost of service, convenience, difficulties and expenses due to the delays at freight houses and the like, delays caused by drivers, etc. The railways entering Boston are co-operating by studying the conditions at the freight houses, including the time occupied in getting to the loading platform. An appropriation for this work was made to the institution by the Edison Electric Illuminating Company of Boston. The research was begun about the middle of the year 1911. A report will be made on the relative merits of electric vehicles, other mechanical vehicles and horse vehicles for city and suburban delivery, for trucking and other purposes for which vehicles are used in the city and suburbs.

Steamship men in New York City report that trans-Atlantic freight traffic is now heavier than it has been before for ten years, and rates to all European ports have increased from 25 per cent. to 100 per cent., and even more, the higher percentages representing the changes in cotton and grain. The vessel men have taken care not to make heavy advances in the rates on traffic which thereby would be restricted. Because of the dullness, or a tendency to dullness, at home, American manufacturers have been increasing their export trade during the past year. Tramp steamers have not been numerous at American ports recently, many of them having been drawn into the South American and African trade. Also, by reason of the small profit in ocean transportation during the past ten years, the number of tramp steamers has diminished. One of the regular trans-Atlantic lines has recently been compelled to charter 30 tramp steamers at a high price in order to carry out its agreements with shippers.

### Freight Car Balance and Performance.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association in presenting statistical bulletin No. 116, covering car balance and performance for November, 1911, says:

"As in previous years, there are decreases in nearly all of the




Car Balance and Performance and Earnings.

CAR BALANCE AND PERFORMANCE IN NOVEMBER, 1911.

| | New England. | N. Y., N. J., Del., Md., Eastern Pa. | Ohio, Ind., Mich., Western Pa. | Va., W. Va., No. and So. Carolina. | Ky., Tenn., Miss., Ala., Ga., Fla. | Iowa, Ill., Wis., Minn. | Mont., Wyo., Neb., Dakotas. | Kan., Colo., Okla., Mo., Ark. | Texas, La., New Mex. | Ore., Idaho, Nev., Cal., Ariz. | Canadian Lines. | Grand Total. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Revenue freight cars owned | 87,239 | 472,318 | 213,354 | 184,614 | 170,841 | 393,355 | 18,500 | 135,495 | 29,112 | 143,951 | 110,844 | 1,959,677 |
| Average number of system cars on line | 44,165 | 274,773 | 112,620 | 99,746 | 92,637 | 243,409 | 6,503 | 71,797 | 21,234 | 60,642 | 72,512 | 1,100,038 |
| Railway-owned cars: Average foreign on line | 53,327 | 181,093 | 97,787 | 65,346 | 71,580 | 151,261 | 13,384 | 70,871 | 34,189 | 65,312 | 50,158 | 854,308 |
| Total Railway-owned cars on line | 97,492 | 455,866 | 210,407 | 165,092 | 164,217 | 394,670 | 19,887 | 142,668 | 55,423 | 125,954 | 122,670 | 1,954,346 |
| Excess | 10,199 | ..... | ..... | ..... | ..... | 1,315 | 1,387 | 7,173 | 26,311 | ..... | 11,826 | ..... |
| Per cent. of cars on line to total owned: | | | | | | | | | | | | |
| Home | 51 | 58 | 53 | 54 | 54 | 62 | 35 | 53 | 73 | 42 | 65 | 56 |
| Foreign | 61 | 38 | 46 | 35 | 42 | 38 | 72 | 52 | 117 | 45 | 45 | 44 |
| All railways | 112 | 96 | 99 | 89 | 96 | 100 | 107 | 105 | 190 | 87 | 110 | 100 |
| Private cars on line | 4,261 | 31,187 | 11,626 | 3,935 | 7,304 | 15,148 | 2,412 | 9,306 | 4,390 | 11,875 | 3,012 | 104,456 |
| Total, all cars on line | 101,753 | 487,053 | 222,033 | 169,027 | 171,521 | 409,818 | 22,299 | 151,974 | 59,813 | 137,829 | 125,682 | 2,058,802 |
| Per cent. of cars in shop | 6.66 | 6.98 | 7.40 | 6.39 | 8.69 | 6.34 | 5.70 | 6.70 | 4.37 | 5.27 | 6.46 | 6.75 |
| No. of freight engines owned | 1,430 | 7,644 | 3,048 | 3,150 | 2,704 | 6,446 | 525 | 2,665 | 792 | 2,695 | 2,157 | 33,256 |
| Average cars on line per freight engine owned | 71 | 64 | 73 | 54 | 63 | 64 | 42 | 57 | 76 | 51 | 58 | 62 |
| Total freight-car mileage | 57,874,603 | 520,650,431 | 146,070,088 | 130,027,764 | 119,287,880 | 303,049,582 | 25,993,884 | 98,906,179 | 42,967,372 | 127,116,453 | 98,583,610 | 1,670,527,846 |
| Average miles per car per day | 19.0 | 24.0 | 21.9 | 25.6 | 23.2 | 24.6 | 38.9 | 22.8 | 23.9 | 30.7 | 26.1 | 24.4 |
| Per cent. loaded mileage | 72.8 | 67.4 | 71.6 | 67.7 | 72.0 | 71.4 | 73.6 | 71.3 | 72.2 | 73.8 | 80.1 | 70.8 |
| Ton-miles of freight, including company freight | 654,782,879 | 8,431,686,419 | 2,421,237,584 | 2,003,035,509 | 1,629,775,196 | 2,827,449,883 | 398,381,521 | 1,397,497,207 | 458,803,751 | 1,879,041,078 | 1,602,767,097 | 23,704,458,184 |
| Average ton-miles, including company freight: | | | | | | | | | | | | |
| Per car-mile | 11.3 | 16.2 | 16.9 | 15.4 | 13.8 | 14.1 | 15.7 | 14.1 | 12.6 | 15.0 | 16.4 | 15.3 |
| Per loaded car-mile | 15.5 | 24.0 | 23.7 | 25.8 | 19.2 | 20.2 | 21.3 | 20.0 | 17.3 | 20.4 | 20.4 | 21.9 |
| Per car per day | 215 | 408 | 372 | 397 | 321 | 355 | 729 | 322 | 316 | 460 | 427 | 376 |
| Gross freight earnings | $7,191,578 | $50,278,202 | $13,771,761 | $12,627,031 | $12,558,540 | $32,069,164 | $3,202,221 | $10,906,903 | $5,209,668 | $17,967,390 | $10,522,884 | $176,305,342 |
| Average daily earnings: Per car owned | $2.75 | $2.59 | $2.15 | $2.28 | $2.48 | $2.72 | $5.77 | $2.68 | $5.97 | $4.16 | $3.18 | $2.77 |
| Per railroad car on line | 2.46 | 2.69 | 2.18 | 2.55 | 2.58 | 2.71 | 5.37 | 2.55 | 3.13 | 4.79 | 2.87 | 2.78 |
| All cars on line | 2.36 | 2.52 | 2.07 | 2.49 | 2.47 | 2.61 | 4.79 | 2.39 | 2.90 | 4.35 | 2.81 | 2.64 |

November performance averages as compared with October, 1911. There is a decrease in the per cent. of cars on their home line from 58 in October to 56 in November, but a decrease in the per cent. of loaded mileage from 72.6 in October to 70.8 in November, indicating the beginning of a movement of empty cars toward home.

"The average miles per car per day decreased from 25.0 to 24.4. The increase of 0.8 tons in the tons per loaded car per day indicates improved loading, but the decrease in average ton miles per car per day for all cars from 382 in October to 376 in November, or 6 ton miles, shows the effect of the decreased percentage of loaded mileage. The earnings per car per day show a decrease of $0.08, having decreased from $2.72 to $2.64."

The accompanying table gives car balance and performance in the month covered by the report, and the two diagrams show car earnings and car mileage and certain car performance figures monthly from July, 1907.

## The Traffic Club of New York.

The regular meeting of the Traffic Club of New York will be held at the Waldor-Astoria hotel on March 26. An amateur vaudeville entertainment given by members of the club will begin directly after the business meeting.

## Crop Conditions.

The crop reporting board of the United States department of agriculture estimates that the quantity of wheat on farms March 1, 1912, was about 122,025,000 bushels, or 19.6 per cent. of the 1911 crop, against 162,705,000 bushels, or 25.6 per cent. of the 1910 crop on farms March 1, 1911, and 160,214,000 bushels, or 23.4 per cent. of the 1909 crop on farms March 1, 1910. About 56.1 per cent. of the crop will be shipped out of the counties where grown, against 55.6 per cent. of the 1910 crop and 61.1 per cent. of the 1909 crop so shipped.

The quantity of corn on farms March 1, 1912, was about 884,069,000 bushels, or 34.9 per cent. of the 1911 crop, against 1,165,378,000 bushels, or 40.4 per cent. of the 1910 crop on farms March 1, 1911, and 977,561,000 bushels, or 38.3 per cent. of the 1909 crop on farms March 1, 1910. About 20.5 per cent. of the crop will be shipped out of the counties where grown, against 22.9 per cent. of the 1910 crop and 24.9 per cent. of the 1909 crop so shipped. The proportion of the total 1911 crop which is merchantable is about 80.1 per cent., against 86.4 per cent. of the 1910 crop and 82.5 per cent. of the 1909 crop.

The quantity of oats on farms March 1, 1912, was about 289,988,000 bushels, or 31.4 per cent. of the 1911 crop, against 442,665,000 bushels, or 37.3 per cent. of the 1910 crop on farms March 1, 1911, and 365,432,000 bushels, or 36.3 per cent. of the 1909 crop on farms March 1, 1910. About 28.8 per cent. of the crop will be shipped out of the counties where grown, against 30.6 per cent. of the 1910 crop and 32.7 per cent. of the 1909 crop so shipped.

The quantity of barley on farms March 1, 1912, was about 24,760,000 bushels, or 15.5 per cent. of the 1911 crop, against 33,498,000 bushels, or 19.3 per cent. of the 1910 crop on farms March 1, 1911, and 42,602,000 bushels, or 24.6 per cent. of the 1909 crop on farms March 1, 1910. About 57.2 per cent. will be shipped out of the counties where grown, against 50.0 per cent. of the 1910 crop and 52.5 per cent. of the 1909 crop so shipped.

| States. | Wheat. | | | | Corn. | | | |
|---|---|---|---|---|---|---|---|---|
| | Per Cent. of 1911 crop. | Millions of Bushels. | | | Per Cent. of 1911 crop. | Millions of Bushels. | | |
| | 1912. | 1912. | 1911. | 1910. | 1912. | 1912. | 1911. | 1910. |
| Pennsylvania | 28 | 4.9 | 9.3 | 7.8 | 34 | 21.7 | 22.3 | 12.0 |
| Ohio | 27 | 9.8 | 11.0 | 8.3 | 35 | 52.7 | 56.4 | 63.0 |
| Indiana | 21 | 7.2 | 8.8 | 7.1 | 36 | 62.9 | 79.2 | 76.2 |
| Illinois | 17 | 7.1 | 7.7 | 7.9 | 36 | 120.6 | 172.3 | 163.9 |
| Michigan | 24 | 4.4 | 5.6 | 4.6 | 30 | 16.7 | 18.9 | 17.5 |
| Wisconsin | 28 | 0.9 | 1.2 | 0.8 | 30 | 17.4 | 14.8 | 16.2 |
| Minnesota | 25 | 11.0 | 19.2 | 14.8 | 35 | 25.9 | 19.3 | 24.4 |
| Iowa | 28 | 3.0 | 4.0 | 2.6 | 40 | 122.1 | 151.3 | 143.5 |
| Missouri | 18 | 6.5 | 5.7 | 5.1 | 30 | 57.7 | 104.0 | 68.9 |
| North Dakota | 19 | 13.9 | 11.6 | 29.2 | 25 | 1.8 | 0.2 | 1.1 |
| South Dakota | 25 | 3.7 | 11.7 | 12.2 | 25 | 12.7 | 13.1 | 21.7 |
| Nebraska | 22 | 9.2 | 12.8 | 12.4 | 37 | 57.7 | 84.3 | 79.3 |
| Kansas | 15 | 7.7 | 12.6 | 15.5 | 26 | 32.8 | 71.4 | 54.1 |
| Kentucky | 15 | 1.5 | 1.9 | 1.5 | 34 | 31.8 | 41.6 | 31.7 |
| Tennessee | 19 | 1.6 | 1.9 | 1.2 | 39 | 35.5 | 38.7 | 25.0 |
| Texas | 8 | 0.5 | 1.5 | 0.2 | 15 | 10.4 | 47.6 | 18.1 |
| Idaho | 20 | 3.2 | 2.3 | 2.6 | 12 | .... | 0.0 | 0.0 |
| Washington | 10 | 5.1 | 5.3 | 7.4 | 17 | 0.1 | 0.2 | 0.1 |
| Oregon | 13 | 2.2 | 2.1 | 1.7 | 13 | 0.1 | 0.1 | 0.1 |
| United States | 19.6 | 122.0 | 162.7 | 160.2 | 34.9 | 884.1 | 1,165.4 | 977.6 |

| | Oats. | | | | Barley. | | | |
|---|---|---|---|---|---|---|---|---|
| New York | 40 | 15.4 | 19.1 | 13.9 | 20 | 0.4 | 0.6 | 0.5 |
| Pennsylvania | 36 | 11.4 | 17.3 | 9.9 | 34 | 0.1 | 0.1 | 0.0 |
| Ohio | 30 | 16.4 | 24.4 | 21.3 | 12 | 0.1 | 0.2 | 0.1 |
| Indiana | 25 | 11.8 | 19.0 | 16.7 | 17 | 0.0 | 0.1 | 0.0 |
| Illinois | 28 | 34.0 | 60.8 | 51.1 | 19 | 0.3 | 0.5 | 0.5 |
| Michigan | 33 | 14.2 | 20.1 | 16.7 | 14 | 0.3 | 0.6 | 0.4 |
| Wisconsin | 38 | 25.5 | 28.8 | 31.4 | 14 | 2.9 | 4.1 | 6.6 |
| Minnesota | 35 | 23.5 | 30.8 | 37.6 | 17 | 4.8 | 5.8 | 9.1 |
| Iowa | 37 | 46.7 | 81.0 | 44.9 | 20 | 2.2 | 3.9 | 2.7 |
| Missouri | 31 | 5.5 | 16.1 | 8.7 | 25 | 0.0 | 0.1 | 0.0 |
| North Dakota | 41 | 21.0 | 4.5 | 30.3 | 18 | 3.7 | 1.5 | 7.9 |
| South Dakota | 24 | 2.7 | 12.5 | 17.4 | 15 | 0.8 | 3.2 | 5.6 |
| Nebraska | 31 | 10.8 | 32.6 | 21.3 | 14 | 0.2 | 0.6 | 0.6 |
| Kansas | 28 | 8.4 | 23.4 | 8.0 | 20 | 0.3 | 1.3 | 0.8 |
| Texas | 13 | 2.4 | 4.8 | 0.8 | 10 | 0.0 | 0.0 | 0.0 |
| Montana | 37 | 7.8 | 5.3 | 5.2 | 35 | 0.4 | 0.2 | 0.2 |
| Idaho | 28 | 4.1 | 3.7 | 3.4 | 15 | 0.9 | 1.1 | 1.2 |
| California | 11 | 0.8 | 1.0 | 0.5 | 11 | 4.5 | 6.5 | 3.2 |
| United States... | 31.4 | 290.0 | 442.7 | 365.4 | 15.5 | 24.8 | 33.5 | 42.6 |

### Car Surpluses and Shortages.

Arthur Hale, chairman of the committee on relations between railways of the American Railway Association in presenting statistical bulletin No. 113-A, giving a summary of shortages and surpluses by groups from October 26, 1910, to February 28, 1912, says:

"There is a further decrease of 5,902 cars in the car surplus, the total surplus for this period being 44,984 cars, as against 50,886 cars on February 14, 1912. The decrease in surplus is reported in all classes of cars, the largest decrease being 2,402 box cars, flat, coal and miscellaneous cars show decreases of 580 cars, 1,225 cars and 1,695 cars respectively.

"The total car shortage (37,142 cars), remained practically the same as in the previous period when it was 36,928 cars."

The accompanying table gives car surplus and shortage figures by groups for the last period covered in the report, and the diagrams show total bi-weekly surpluses and shortages in 1907 to 1912.

### Summary of Revenues and Expenses in December, 1911.

The following is taken from the Bureau of Railway Economics, Bulletin 29:

The railways whose returns are included in this bulletin operate 230,616 miles of line, or about 93 per cent. of all the steam railway mileage in the United States. The total operating revenues for the month of December, 1911, amounted to $229,720,467. Compared with December, 1910, the total operating revenues of these railways show an increase of $917,511. This increase was due exclusively to the increase in mileage of these roads in 1911, as compared with 1910. Thus total operating revenues per mile of line amounted to $1,005 in December, 1910, and $996 in December, 1911, a decrease for 1911 of $9, or 0.9 per cent. This decrease in operating revenues per mile resulted wholly from a decrease in freight revenue.

Operating expenses amounted to $157,882,490. This was $3,331,466 less than for December, 1910. Operating expenses per mile of line amounted to $685 in December, 1911, as compared with $708 in December, 1910, a decrease for 1911 of $23 per mile, or 3.3 per cent. Each of the five primary operating expense accounts shows a decrease per mile in 1911 as compared with 1910. These decreases amounted to $13.45 in the cost of conducting transportation; $5.33 in the cost of maintaining way and structures; $4.50 in the cost of maintaining equipment, and smaller decreases in the remaining accounts.

Net operating revenue shows an increase as compared with December, 1910, of $15 per mile, or 4.9 per cent. The net revenue for each mile of line for each day in December averaged $10.05 as compared with $9.57 for December, 1910.

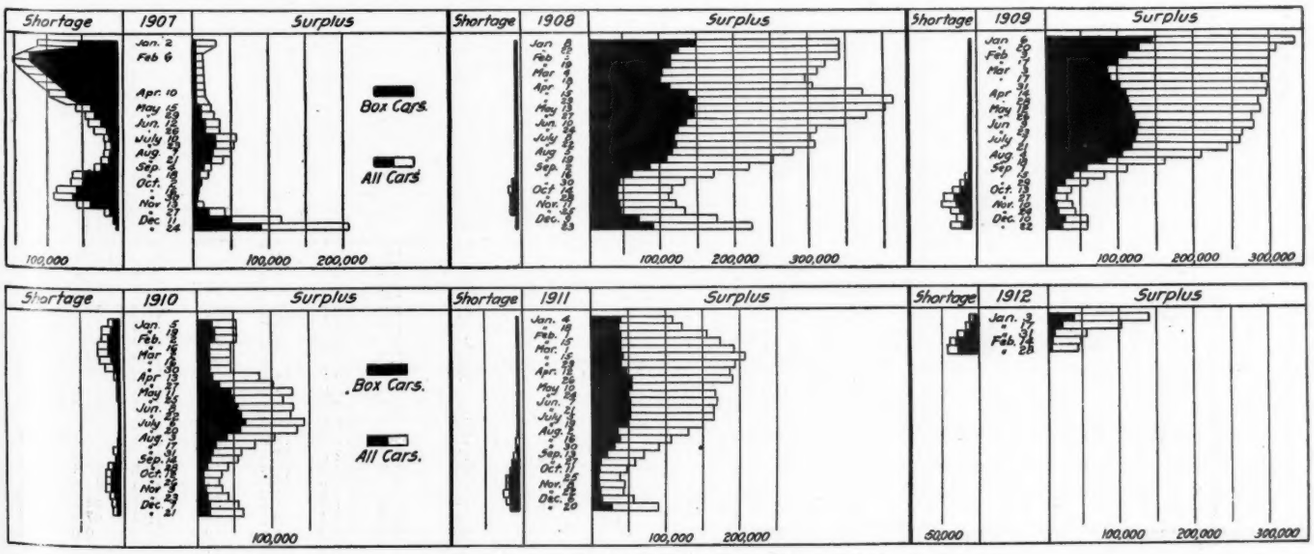
Taxes for the month of December amounted to $10,043,839, or $43.55 per mile, an increase of 8.5 per cent. over December, 1910. The operating ratio for December was 68.7 per cent., as compared with 67.1 in November, 1911, and 70.5 per cent. in December, 1910.

The eastern group of railways shows an increase in total

CAR SURPLUSES AND SHORTAGES.

| Date. | No. of roads. | Surpluses Box. | Flat. | Coal gondola and hopper. | Other kinds. | Total. | Shortages Box. | Flat. | Coal, gondola and hopper. | Other kinds. | Total. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Group *1.—February 28, 1912 | 7 | 206 | 1,464 | 378 | 95 | 2,143 | 449 | 30 | 0 | 57 | 536 |
| " 2.— " 28, 1912 | 26 | 387 | 133 | 1,368 | 642 | 2,530 | 859 | 6 | 2,182 | 430 | 3,477 |
| " 3.— " 28, 1912 | 24 | 0 | 942 | 1,056 | 1,601 | 3,599 | 5,115 | 25 | 2,186 | 1,475 | 8,801 |
| " 4.— " 28, 1912 | 10 | 151 | 44 | 440 | 822 | 1,457 | 1,730 | 197 | 3,200 | 600 | 5,727 |
| " 5.— " 28, 1912 | 18 | 7 | 40 | 4 | 644 | 695 | 3,204 | 72 | 326 | 415 | 4,017 |
| " 6.— " 28, 1912 | 23 | 1,997 | 436 | 2,043 | 2,895 | 7,371 | 3,735 | 191 | 69 | 148 | 4,143 |
| " 7.— " 28, 1912 | 3 | 24 | 117 | 481 | 217 | 839 | 236 | 0 | 0 | 0 | 236 |
| " 8.— " 28, 1912 | 17 | 1,053 | 242 | 1,363 | 2,134 | 4,792 | 771 | 75 | 175 | 4 | 1,025 |
| " 9.— " 28, 1912 | 11 | 2,081 | 261 | 409 | 895 | 3,646 | 250 | 15 | 15 | 50 | 330 |
| " 10.— " 28, 1912 | 20 | 3,101 | 3,171 | 2,697 | 8,057 | 17,026 | 238 | 0 | 0 | 0 | 238 |
| " 11.— " 28, 1912 | 5 | 17 | 366 | 0 | 503 | 886 | 6,927 | 120 | 0 | 1,565 | 8,612 |
| Total | 164 | 9,024 | 7,216 | 10,239 | 18,505 | 44,984 | 23,514 | 731 | 8,153 | 4,744 | 37,142 |

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin, Minnesota and the Dakotas lines; Group 7—Montana, Wyoming and Nebraska lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Oregon, Idaho, California and Arizona lines; Group 11—Canadian lines.



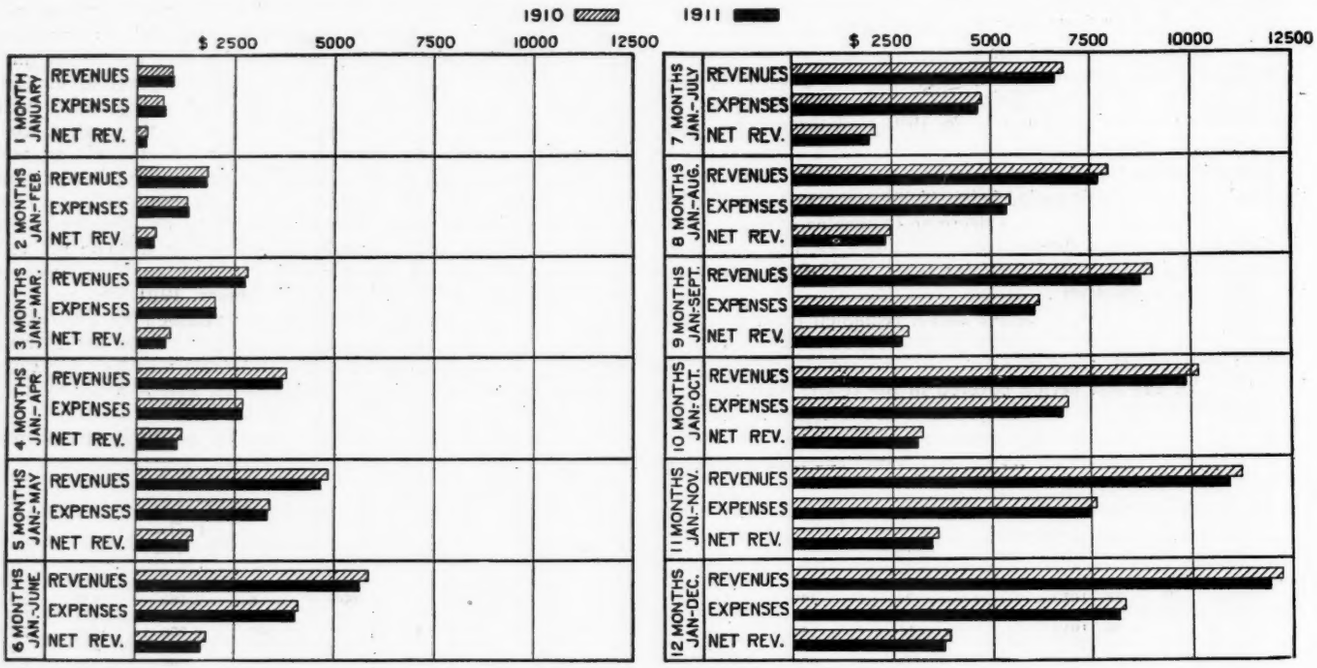

Car Surpluses and Shortages in 1907 to 1912.

operating revenues per mile as compared with December, 1910, of 1.1 per cent., and the southern group an increase of .7 per cent., while the operating revenues per mile of the western group decreased 3.5 per cent. from December, 1910. Operating expenses per mile decreased 3.9 per cent. on the eastern railways as compared with December, 1910, and on the western railways 4.4 per cent., but increased on the southern railways 3.1 per cent. In the eastern group the net revenue per mile increased 16.2 per cent., as compared with December, 1910; in the southern group there was a decrease of 3.6 per cent.; in the western group a decrease of 1.6 per cent. Taxes increased in all the groups as compared with December, 1910, the increase per mile amounting to 3.5 per cent. in the eastern group, 1.5 per cent. in the southern group, and 16.7 per cent. increase in the western group.

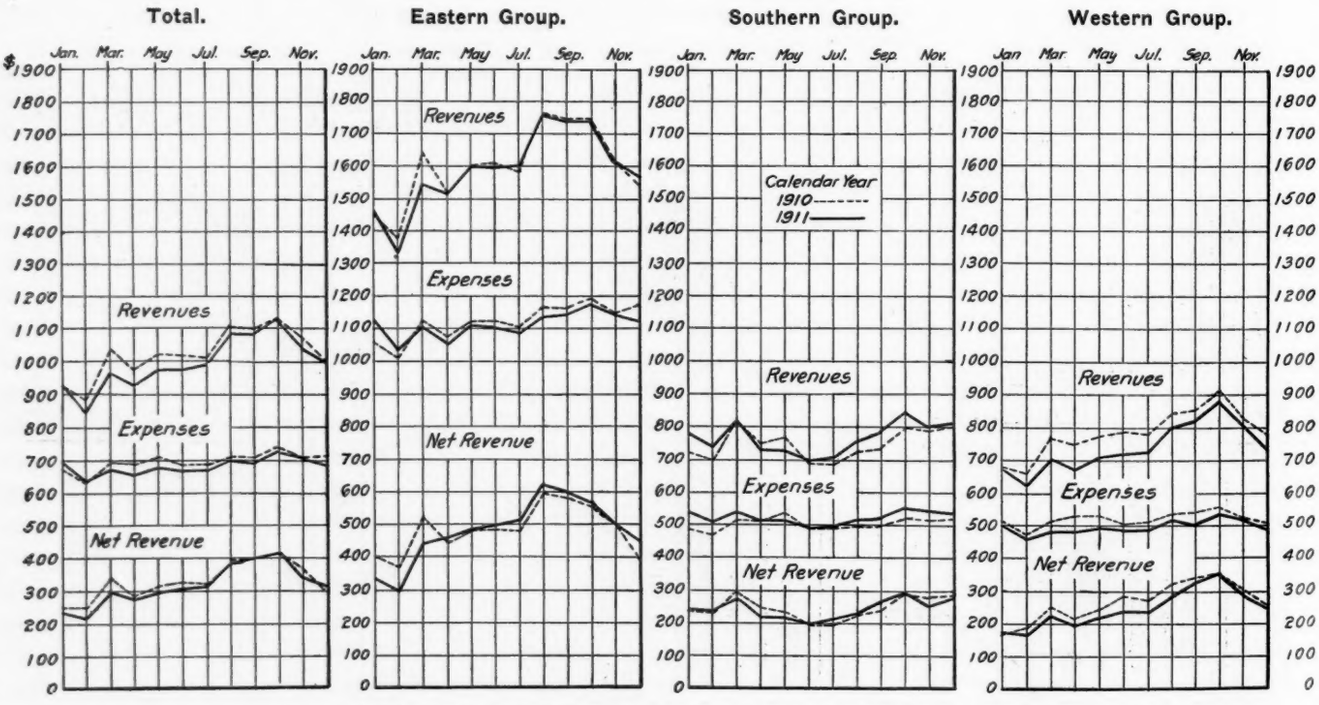
Diagram I shows the variations in operating revenues, operating expenses, and net revenue per mile for the separate months of the calendar years 1910 and 1911. Diagram 11 shows month by month the total operating results per mile cumulatively for both 1910 and 1911. Thus there is shown the total operating revenues per mile, operating expenses per mile, and net revenue per mile, for the periods ending successively with the respective twelve months of the calendar years.

Compilation of December returns makes possible a summary of the conditions for the calendar year, in which 95 per cent. of the steam railway mileage of the United States is represented. Although the situation from a comparative standpoint is not so serious as it was earlier in the year, yet these summary figures show results distinctly less favorable than the results for the year 1910.

Total operating revenues for 1911, amounting to $2,724,554,175, when reduced to a per mile basis, show a decrease from the




**Cumulative Earnings and Expenses Per Mile for 1911.**




**Monthly Non-Cumulative Earnings and Expenses Per Mile.**

revenues of the calendar year 1910 of $302, or 2.5 per cent., the decline being wholly in freight revenue. Operating expenses decreased $147 per mile of line, or 1.8 per cent., and net operating revenue $155 per mile, or 4 per cent. Taxes per mile increased 4.1 per cent.

Separating these results by geographical groups, it develops that the most serious situation is to be found in the western group of railways. Whereas there was a decline of only 0.7 per cent. in operating revenues per mile in the eastern group and an actual increase of 2.8 per cent. in the southern group, there was a decrease of 5.7 per cent. in the western group. In this latter group decreases are found in both passenger and freight traffic, although the larger decrease is in the freight revenue. All three groups show declines in net revenue per mile, but they are relatively insignificant in the eastern and southern groups, amounting to 0.7 per cent. in the eastern and 0.2 per cent. in the southern. In the western group, however, the decline amounts to 8 per cent. This decline on the western railways took place notwithstanding a cut in total operating expenses which amounted on a per mile basis to 4.5 per cent., and which in the account of maintenance of way amounted to 10.3 per cent.

SUMMARY FOR THE CALENDAR YEAR, 1911.

| Account. | Total. Amount, 1911. | Total. Per Mile of Line. | Total. Increase per mile over 1910. Pct. | Eastern Group. Amount, 1911. | Eastern Group. Per Mile of Line. | Eastern Group. Increase per mile over 1910. Pct. | Southern Group. Amount, 1911. | Southern Group. Per Mile of Line. | Southern Group. Increase per mile over 1910. Pct. | Western Group. Amount, 1911. | Western Group. Per Mile of Line. | Western Group. Increase per mile over 1910. Pct. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Operating Revenues.. | $2,724,554,175 | $11,799 | d 2.5 | $1,285,772,847 | $18,787 | d .7 | $357,660,897 | $9,091 | 2.8 | $1,081,120,431 | $8,778 | d 5.7 |
| Freight ..... | 1,869,260,225 | 8,095 | d 3.9 | 888,323,542 | 12,987 | d 1.7 | 254,894,137 | 6,479 | 1.6 | 726,042,546 | 5,895 | d 7.7 |
| Passenger ..... | 646,028,739 | 2,798 | .4 | 294,815,014 | 4,310 | 1.7 | 77,985,007 | 1,982 | 5.7 | 273,228,718 | 2,218 | d 2.0 |
| Other transportation..... | 181,640,498 | 787 | 1.6 | 89,114,865 | 1,303 | 1.7 | 20,582,805 | 523 | 4.2 | 71,942,828 | 584 | 1.4 |
| Non-transportation ..... | 27,624,713 | 120 | 3.6 | 13,519,426 | 198 | 3.9 | 4,198,948 | 107 | 20.2 | 9,906,339 | 80 | d 1.9 |
| Total Operating Expenses... | 1,866,256,400 | 8,082 | d 1.8 | 898,777,783 | 13,139 | d .7 | 243,701,583 | 6,194 | 4.3 | 723,777,034 | 5,876 | d 4.5 |
| Maint. of way and struct.. | 350,880,829 | 1,520 | d 6.5 | 156,102,272 | 2,282 | d 4.6 | 48,082,476 | 1,222 | 1.1 | 146,696,081 | 1,191 | d10.3 |
| Maint. of equipment..... | 422,383,001 | 1,829 | d 1.0 | 212,405,639 | 3,105 | d 1.2 | 59,566,866 | 1,514 | 3.6 | 150,410,496 | 1,221 | d 1.7 |
| Traffic ..... | 57,992,854 | 251 | d .7 | 24,762,802 | 362 | d 4.8 | 8,386,718 | 213 | .3 | 24,843,334 | 202 | 4.0 |
| Transportation ..... | 964,667,627 | 4,178 | d .6 | 474,253,659 | 6,933 | .9 | 117,511,404 | 2,987 | 6.6 | 372,902,564 | 3,028 | d 4.0 |
| General ..... | 70,332,089 | 305 | 2.1 | 31,253,411 | 457 | 3.8 | 10,154,119 | 258 | 1.7 | 28,924,559 | 235 | .9 |
| Net Operating Revenue..... | 858,297,775 | 3,717 | d 4.0 | 386,995,064 | 5,658 | d .7 | 113,959,314 | 2,896 | d .2 | 357,343,397 | 2,901 | d 8.0 |
| Outside Oper.—Net Rev..... | 1,415,712 | 6 | ... | 954,004 | 14 | ... | 247,882 | 6 | ... | 213,826 | 2 | ... |
| Taxes ..... | 111,262,863 | 482 | 4.1 | 52,028,572 | 761 | 6.6 | 13,030,717 | 331 | 9.8 | 46,203,574 | 375 | .5 |
| Operating Income ..... | 748,450,624 | 3,241 | d 5.0 | 335,920,496 | 4,911 | d 1.5 | 101,176,479 | 2,572 | d 1.5 | 311,353,649 | 2,528 | d 9.3 |
| Average miles operated—1911 | | 230,913 | | | 68,403 | | | 39,344 | | | 123,166 | |
| 1910 | | 227,444 | | | 67,969 | | | 38,950 | | | 120,525 | |

d Decrease.

PER CENT. OF DIFFERENT CLASSES OF EXPENSES TO TOTAL OPERATING REVENUES.

| | December. 1911. | December. 1910. | Fiscal year ended June 30. 1911. | Fiscal year ended June 30. 1910. | Twelve mos. ended December 31. 1911. | Twelve mos. ended December 31. 1910. |
|---|---|---|---|---|---|---|
| Maintenance of way and structures | 11.3 | 11.7 | 13.1 | 13.4 | 12.9 | 13.4 |
| Maintenance of equipment..... | 15.7 | 16.1 | 15.3 | 15.0 | 15.5 | 15.3 |
| Traffic expenses ..... | 2.1 | 2.1 | 2.1 | 2.0 | 2.1 | 2.1 |
| Transportation expenses ..... | 36.9 | 37.9 | 35.5 | 33.4 | 35.4 | 34.7 |
| Total operating expenses ..... | 68.7 | 70.5 | 68.6 | 66.3 | 68.4 | 67.9 |

## INTERSTATE COMMERCE COMMISSION.

A hearing on complaints regarding alleged irregularities in determining weights of carload shipments will be held before Special Attorney J. T. Marchand of the Interstate Commerce Commission in Chicago on March 25.

The St. Louis Blast Furnace Company has filed a complaint with the commission against the rates on coke from Deepwater, W. Va., to St. Louis, alleging discrimination against St. Louis pig iron manufacturers in favor of manufacturers in Chicago, Gary, Ind., and other points.

The Chicago Board of Trade has filed a complaint with the commission, asking that the Louisville & Nashville be required to comply with the order of the commission in the recent Rosenbaum case and with the transit rules promulgated by the commission. It is alleged that the road charges south of the Ohio river 2 cents per 100 lbs. more on grain passing through Chicago than on grain moving through St. Louis or Peoria, unless the identity of the grain moving through Chicago is preserved.

Testimony regarding the operation of the Muncie & Western, an industrial railway, 2.78 miles long, owned by the Ball Brothers Glass Manufacturing Company of Muncie, Ind., was heard by Examiner Prouty of the Commission at Muncie on March 8, in connection with the commission's investigation of industrial railways. It was testified at the hearing that the road receives an allowance of $2.50 per car on inbound freight and of $3.50 per car on outbound freight, and that it serves the Glass Works exclusively.

### Rate on Cotton Seed Reduced.

*Memphis Freight Bureau et al. v. St. Louis Southwestern et al. Opinion by Commissioner Clark:*

Rates on cotton seed from Missouri and Arkansas points to Memphis, Tenn., found to be unreasonable. (22 I. C. C., 537.)

### Complaint Dismissed.

*Milburn Wagon Co. v. Lake Shore & Michigan Southern et al. Opinion by the commission:*

The rate charged is found to be the legal one and no evidence was presented to show that it was unreasonable. (22 I. C. C., 460.)

### Reparation Awarded.

*Milburn Wagon Co. v. Lake Shore & Michigan Southern. Opinion by the commission:*

The initial carrier furnished a car larger than the one ordered by the shippers and the minimum weight was charged on the larger car furnished. (22 I. C. C., 511.)

*Lindsay Brothers v. Lake Shore & Michigan Southern et al. Opinion by the commission:*

A joint rate of 23½ cents per 100 lbs. on vehicles in carloads from Elkhart, Ind., to Milwaukee, Wis., found unreasonable and the rate reduced to 18½ cents. The railways are ordered to amend their tariffs so as to provide that when a road is unable to furnish a large car ordered by a shipper, they may furnish two small ones, and the minimum weight on the car ordered will apply to the two small cars. (22 I. C. C., 516.)

### Conference Rulings.

The commission is of the opinion that railways refusing to observe specific routing instructions by shippers are liable to prosecution under section 10 and under section 15.

In a case where a railway ships material for repairing one of its own cars over its own line and over the line of a connection to the shop belonging to the connecting line where the repairs were to be made, the line at whose expense the repairs are made is the only one which may move this material free.

A gasolene motor car, moving under its own power and in charge of employees of the manufacturer, must pay a freight rate and tariffs must be filed covering a proper charge. The manufacturers' employees in charge of the car must be charged passenger rates.

Household goods of an inspector of the American Railway Association Bureau for the Safe Transportation of Explosives cannot be carried free by a railway which is a member of the association.

## REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF JANUARY, 1912.

| Name of road. | Mileage operated at end of period. | Operating revenues: Freight. | Passenger. | Total, inc. misc. | Operating expenses: Maintenance: Way and structures. | Maintenance: Of equipment. | Traffic. | Transportation. | General. | Total. | Net operating revenue (or deficit). | Outside operations, net. | Taxes. | Operating income (or loss). | Increase (or decr.) comp. with last year. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ann Arbor | 291 | $114,523 | $33,417 | $157,970 | $14,480 | $23,685 | $4,132 | $69,622 | $7,381 | $119,300 | $38,670 | —$8,574 | $13,986 | $16,110 | —$22,316 |
| Arizona Eastern | 366[1] | 133,468 | 34,011 | 177,894 | 21,736 | 13,142 | 2,382 | 48,492 | 5,136 | 90,888 | 87,006 | 218 | 8,100 | 79,124 | 29,158 |
| Atlanta & West Point | 92 | 57,657 | 37,327 | 105,252 | 12,159 | 22,202 | 4,684 | 36,683 | 4,368 | 80,096 | 25,156 | 33 | 5,189 | 20,000 | —9,320 |
| Atlantic City | 166 | 49,878 | 36,334 | 92,515 | 20,661 | 13,474 | 1,566 | 79,516 | 1,519 | 116,736 | —24,221 | —3,602 | 7,000 | —34,823 | —16,490 |
| Baltimore & Ohio—System | 4,433[2] | 5,195,917 | 994,577 | 6,570,122 | 741,664 | 1,331,888 | 165,305 | 2,860,461 | 172,576 | 5,271,894 | 1,298,228 | —66,509 | 281,020 | 950,699 | 79,239 |
| Buffalo & Susquehanna *R. R.* | 265 | 139,204 | 7,346 | 151,359 | 26,525 | 30,622 | 1,482 | 61,552 | 5,951 | 126,132 | 25,227 | ..... | 2,600 | 22,627 | 14,343 |
| Buffalo & Susquehanna *Ry* | 91 | 41,179 | 6,560 | 49,777 | 7,176 | 28,045 | 474 | 24,873 | 2,746 | 63,314 | —13,537 | —9 | 1,400 | —14,946 | 3,486 |
| Central of New Jersey | 671[3] | 1,598,796 | 359,741 | 2,074,078 | 181,968 | 321,211 | 29,596 | 697,747 | 45,383 | 1,275,905 | 798,173 | —11,656 | 180,504 | 606,013 | —160,065 |
| Chesapeake & Ohio Lines | 2,280[4] | 2,146,215 | 378,124 | 2,633,993 | 258,273 | 591,074 | 51,347 | 907,447 | 64,387 | 1,872,528 | 761,465 | —5,684 | 84,750 | 671,031 | —148,931 |
| Chicago & Erie | 269 | 276,888 | 48,161 | 367,663 | 43,743 | 84,560 | 20,723 | 244,303 | 11,733 | 405,062 | —37,399 | ..... | 16,450 | —53,849 | —76,260 |
| Chicago Great Western | 1,496[5] | 566,822 | 200,364 | 843,608 | 102,652 | 152,784 | 47,764 | 513,697 | 33,610 | 850,507 | —6,899 | —323 | 33,037 | —40,259 | —152,091 |
| Chicago, Rock Island & Gulf | 476[6] | 172,439 | 50,436 | 240,019 | 33,099 | 63,225 | 9,644 | 99,630 | 9,180 | 214,778 | 25,241 | —192 | 8,122 | 16,927 | —58,508 |
| Chicago, Terre Haute & Southeastern | 351[7] | 160,426 | 13,818 | 177,955 | 17,999 | 31,335 | 2,810 | 64,118 | 8,040 | 124,302 | 53,653 | 127 | 8,700 | 45,080 | 25,614 |
| Cleveland, Akron & Cincinnati † | ... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Colorado Midland | 337 | 105,438 | 14,145 | 135,738 | 15,600 | 28,744 | 6,761 | 64,066 | 5,636 | 120,807 | 14,931 | —63 | 8,000 | 6,868 | 7,006 |
| Delaware & Hudson Co.—R. R. Dept | 851[8] | 1,467,776 | 181,012 | 1,697,169 | 111,570 | 287,939 | 21,729 | 671,909 | 46,986 | 1,140,133 | 557,036 | —4,997 | 47,021 | 504,968 | 29,297 |
| Detroit, Toledo & Ironton | 441 | 120,706 | 10,738 | 142,062 | 28,449 | 19,711 | 2,739 | 77,940 | 5,814 | 134,653 | 7,409 | ..... | 6,000 | 1,409 | 23,095 |
| Duluth, South Shore & Atlantic | 624[9] | 132,519 | 54,623 | 200,348 | 32,807 | 34,370 | 6,750 | 106,990 | 13,108 | 194,025 | 6,323 | —612 | 18,000 | —12,289 | —17,636 |
| El Paso & Southwestern Co | 901 | 572,778 | 83,992 | 685,225 | 84,706 | 85,452 | 12,809 | 193,699 | 24,697 | 401,363 | 283,862 | —1,452 | 22,238 | 260,172 | 33,260 |
| Erie | 1,995 | 2,779,161 | 595,335 | 3,680,666 | 364,036 | 730,460 | 96,167 | 1,517,777 | 90,753 | 2,799,193 | 881,473 | —55,493 | 163,026 | 662,954 | —231,075 |
| Georgia | 307 | 181,577 | 70,222 | 273,086 | 24,244 | 45,197 | 12,964 | 127,334 | 8,272 | 218,011 | 55,075 | ..... | 2,110 | 52,975 | —26,210 |
| Georgia Southern & Florida | 395 | 97,922 | 71,433 | 195,096 | 18,102 | 40,013 | 8,254 | 83,552 | 8,814 | 158,735 | 36,361 | ..... | 9,803 | 26,558 | —2,885 |
| Hocking Valley | 352[10] | 484,097 | 61,313 | 566,839 | 54,752 | 90,513 | 8,224 | 195,038 | 16,563 | 365,090 | 201,749 | ..... | 30,000 | 171,749 | 119,104 |
| International & Great Northern | 1,159 | 645,978 | 165,068 | 881,817 | 107,623 | 106,865 | 24,333 | 399,894 | 30,952 | 669,667 | 212,150 | —142 | 33,000 | 179,008 | ..... |
| Iowa Central ‡ | ... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Kanawha & Michigan | 175 | 202,581 | 23,957 | 231,529 | 27,385 | 45,161 | 2,271 | 73,703 | 6,903 | 155,423 | 76,106 | —6 | 8,674 | 67,426 | —18,207 |
| Lehigh & Hudson River | 96 | 120,375 | 3,120 | 124,960 | 10,111 | 19,437 | 1,256 | 51,992 | 4,498 | 87,294 | 37,666 | ..... | 3,500 | 34,166 | —11,536 |
| Louisiana Ry. & Navigation Co | 350 | 113,165 | 20,191 | 144,381 | 38,667 | 10,486 | 6,575 | 67,655 | 8,862 | 132,245 | 12,136 | ..... | 5,000 | 7,136 | —27,317 |
| Louisiana Western | 207 | 98,828 | 55,232 | 162,439 | 28,757 | 27,091 | 8,405 | 60,843 | 6,610 | 131,706 | 30,733 | 283 | 6,902 | 24,114 | —2,419 |
| Minneapolis & St. Louis | 1,585 | 360,382 | 104,304 | 508,339 | 77,325 | 101,593 | 17,306 | 318,977 | 26,338 | 541,539 | —33,200 | —79 | 28,072 | —61,351 | —189,097 |
| Minneapolis, St. Paul & S. Ste. Marie | 3,769[11] | 1,147,656 | 429,955 | 1,713,551 | 159,481 | 269,195 | 39,030 | 727,043 | 47,102 | 1,241,851 | 471,700 | 5,497 | 107,402 | 369,795 | 86,586 |
| Missouri, Kansas & Texas | 1,744[12] | 906,619 | 339,851 | 1,326,427 | 37,223 | 183,301 | 34,244 | 494,315 | 46,522 | 795,605 | 530,822 | —3,911 | 52,051 | 474,860 | 17,544 |
| Missouri, Kansas & Texas of Texas | 1,345[13] | 562,490 | 228,625 | 854,038 | 197,329 | 102,908 | 25,309 | 556,853 | 37,700 | 920,099 | —66,061 | 9 | 22,000 | —88,052 | —196,170 |
| Mobile & Ohio | 1,114 | 729,628 | 110,075 | 899,101 | 106,630 | 176,484 | 36,841 | 340,660 | 32,180 | 692,795 | 206,306 | —806 | 26,406 | 179,094 | —57,865 |
| Morgan's La. & Tex. R. R. & S. S. Co | 404[14] | 343,264 | 111,878 | 485,997 | 70,403 | 54,015 | 14,874 | 192,108 | 12,590 | 343,990 | 142,007 | —2,622 | 18,698 | 120,687 | —29,230 |
| New Orleans Great Northern | 282 | 92,101 | 23,974 | 125,526 | 23,508 | 19,711 | 2,645 | 43,358 | 7,382 | 96,604 | 28,922 | —38 | 2,000 | 26,884 | —17,754 |
| New Orleans, Texas & Mexico | 276[15] | 122,628 | 17,147 | 148,960 | 32,748 | 19,944 | 4,345 | 67,373 | 8,204 | 132,614 | 16,346 | ..... | ..... | 16,346 | 4,308 |
| New York, Susquehanna & Western | 152 | 171,117 | 40,828 | 240,824 | 18,553 | 26,244 | 1,702 | 108,237 | 4,238 | 158,974 | 81,850 | —7,028 | 17,873 | 56,949 | —21,090 |
| Northwestern Pacific | 416[16] | 77,807 | 104,118 | 203,467 | 48,037 | 39,447 | 3,057 | 95,985 | 10,471 | 196,997 | 6,470 | ..... | 11,077 | —4,607 | 5,299 |
| Philadelphia & Reading | 1,014[17] | 2,973,637 | 540,680 | 3,684,718 | 245,715 | 716,888 | 39,885 | 1,341,915 | 72,918 | 2,417,321 | 1,267,397 | 12,475 | 90,436 | 1,189,436 | —47,306 |
| Pittsburgh, Shawmut & Northern | 278[18] | 127,771 | 7,315 | 136,917 | 11,494 | 26,452 | 1,069 | 45,376 | 4,544 | 88,935 | 47,982 | ..... | 1,569 | 46,413 | 28,463 |
| Port Reading | 21 | 123,459 | ..... | 124,261 | 5,762 | 373 | 33 | 50,032 | 80 | 56,280 | 67,981 | 2,978 | 3,800 | 67,159 | 2,474 |
| Richmond, Fredericksburg & Potomac | 83 | 81,856 | 86,829 | 197,440 | 19,102 | 22,078 | 2,647 | 83,077 | 6,769 | 133,583 | 63,857 | ..... | 1,094 | 62,763 | —864 |
| Rutland | 468 | 132,751 | 71,962 | 235,756 | 30,983 | 50,821 | 6,294 | 114,363 | 5,622 | 208,083 | 27,673 | ..... | 11,018 | 16,655 | 5,461 |
| St. Louis & San Francisco | 4,731 | 1,993,445 | 875,268 | 3,135,172 | 310,640 | 440,767 | 91,719 | 1,259,771 | 105,810 | 2,208,707 | 926,465 | ..... | 166,147 | 760,318 | —211,006 |
| St. Louis, Brownsville & Mexico | 509[19] | 110,829 | 64,189 | 189,655 | 41,533 | 16,843 | 2,478 | 71,648 | 7,741 | 140,243 | 49,412 | ..... | 5,150 | 44,262 | —2,477 |
| St. Louis Merchants' Bridge Terminal | 9 | ..... | 361 | 153,311 | 22,508 | 9,038 | 476 | 90,355 | 4,816 | 127,193 | 26,118 | ..... | 5,600 | 20,518 | 15,752 |
| St. Louis, San Francisco & Texas | 243 | 77,998 | 24,959 | 109,380 | 18,928 | 16,079 | 3,141 | 53,004 | 5,246 | 96,398 | 12,982 | ..... | 1,217 | 11,765 | 14,180 |
| St. Louis Southwestern of Texas | 703 | 275,767 | 74,701 | 379,270 | 66,834 | 89,132 | 11,335 | 159,286 | 18,510 | 345,097 | 34,173 | —369 | 10,945 | 22,859 | 77,334 |
| San Antonio & Aransas Pass | 727 | 220,199 | 78,402 | 322,617 | 69,719 | 46,570 | 5,724 | 148,122 | 10,589 | 280,724 | 41,893 | ..... | 11,000 | 30,893 | 37,309 |
| Seaboard Air Line | 3,053[20] | 1,170,707 | 426,476 | 1,809,474 | 277,755 | 264,691 | 72,794 | 753,915 | 56,294 | 1,425,449 | 384,025 | —2,216 | 75,000 | 306,809 | —198,691 |
| Sunset | 58 | 57,009 | 15,684 | 75,905 | 12,852 | 1,315 | 26 | 21,576 | 1,160 | 36,929 | 38,976 | ..... | 3,390 | 35,586 | —1,143 |
| Tennessee Central | 293 | 70,517 | 26,396 | 104,782 | 26,175 | 16,778 | 5,361 | 44,134 | 7,194 | 99,642 | 5,140 | ..... | 4,212 | 928 | —24,466 |
| Terminal R. R. Ass'n of St. Louis | 35[21] | ..... | 215 | 228,114 | 32,215 | 25,680 | 751 | 102,544 | 4,984 | 166,174 | 61,940 | 11,187 | 26,000 | 47,127 | —31,117 |
| Texas & Pacific | 1,884 | 1,066,501 | 315,921 | 1,464,636 | 155,540 | 199,840 | 30,811 | 725,665 | 48,510 | 1,160,366 | 304,270 | —12,111 | 48,197 | 243,962 | 21,328 |
| Toledo & Ohio Central | 440[22] | 340,660 | 43,548 | 397,520 | 49,166 | 81,638 | 5,680 | 172,678 | 8,854 | 318,016 | 79,504 | —690 | 21,579 | 57,235 | 33,667 |
| Trinity & Brazos Valley | 462 | 207,765 | 32,380 | 249,050 | 50,398 | 38,183 | 10,236 | 136,501 | 11,924 | 247,242 | 1,808 | ..... | 3,500 | —1,692 | —13,393 |
| Ulster & Delaware | 128 | 33,527 | 11,712 | 48,498 | 7,622 | 12,207 | 1,159 | 31,521 | 2,564 | 55,073 | —6,575 | 164 | 3,300 | —9,711 | —3,544 |
| Virginia & Southwestern | 240[23] | 136,714 | 11,217 | 151,674 | 16,252 | 32,849 | 1,912 | 48,979 | 3,544 | 103,536 | 48,138 | ..... | 5,332 | 42,806 | 3,015 |
| Wabash | 2,514 | 1,401,209 | 479,330 | 2,060,365 | 183,976 | 392,395 | 60,903 | 964,022 | 64,348 | 1,665,644 | 394,721 | —3,272 | 71,655 | 319,794 | —75,725 |
| Washington Southern | 35 | 27,951 | 41,106 | 94,415 | 11,501 | 10,229 | 1,239 | 40,918 | 2,899 | 66,786 | 27,629 | ..... | 3,245 | 24,384 | —5,834 |
| Western Pacific | 934 | 242,939 | 64,468 | 327,197 | 74,530 | 39,656 | 26,155 | 182,282 | 22,968 | 345,591 | —18,394 | —4,068 | 14,550 | —37,013 | ..... |
| Western Ry. of Alabama | 133 | 68,254 | 42,291 | 120,244 | 21,894 | 24,208 | 5,472 | 37,901 | 5,783 | 95,258 | 24,986 | —37 | 4,612 | 20,337 | —2,784 |

† Included in Penna. Co., January, 1911. ‡ Leased to Minn. & St. Louis, December 20, 1911.
Operated in previous period—[1] 354; [2] 4,434; [3] 631; [4] 2,225; [5] 1,495; [6] 470; [7] 350; [8] 819; [9] 610; [10] 350; [11] 3,763; [12] 1,736; [13] 1,348; [14] 348; [15] 264; [19] 376; [17] 1,022; [18] 240; [19] 501; [20] 3,046; [21] 34; [22] 444; [23] 242.
— Indicates Deficits, Losses and Decreases.

## REVENUES AND EXPENSES OF RAILWAYS.

SEVEN MONTHS OF FISCAL YEAR, 1912.

| Name of road. | Mileage operated at end of period. | Operating revenues | | | Operating expenses | | | | | | Net operating revenue (or deficit). | Outside operations, net. | Taxes. | Operating income (or loss). | Increase (or decr.) comp. with last year. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Maintenance | | | | | | | | | | |
| | | Freight. | Passenger. | Total, inc. misc. | Way and structures. | Of equipment. | Traffic. | Transportation. | General. | Total. | | | | | |
| Ann Arbor | 291 | $845,477 | $349,399 | $1,274,661 | $142,077 | $135,009 | $31,181 | $446,054 | $54,914 | $809,235 | $465,426 | —$6,129 | $97,899 | $361,398 | $46,134 |
| Arizona Eastern | 366[1] | 825,754 | 230,020 | 1,121,906 | 170,023 | 85,469 | 15,940 | 302,485 | 43,257 | 617,174 | 504,732 | 1,216 | 70,408 | 435,540 | 92,718 |
| Atlanta & West Point | 92 | 395,960 | 290,427 | 756,551 | 87,763 | 146,973 | 33,691 | 229,491 | 33,891 | 531,809 | 224,742 | 104 | 36,373 | 188,523 | —10,495 |
| Atlantic City | 166 | 458,666 | 821,243 | 1,347,058 | 183,338 | 92,519 | 18,221 | 638,451 | 9,511 | 942,040 | 405,018 | —29,601 | 49,000 | 326,417 | 12,223 |
| Baltimore & Ohio—System | 4,433[2] | 41,177,475 | 9,117,471 | 53,492,506 | 6,643,575 | 9,699,165 | 1,132,609 | 18,700,335 | 1,155,000 | 37,330,684 | 16,161,822 | 391,626 | 1,718,806 | 14,051,390 | 1,148,071 |
| Buffalo & Susquehanna *R. R.* | 265 | 979,952 | 65,659 | 1,082,293 | 207,918 | 200,355 | 10,637 | 401,274 | 44,250 | 864,434 | 217,859 | ..... | 18,200 | 199,659 | 35,640 |
| Buffalo & Susquehanna *Ry* | 91 | 299,190 | 69,633 | 383,631 | 45,583 | 188,618 | 3,587 | 165,983 | 17,712 | 421,483 | —37,852 | —357 | 9,800 | —48,009 | —18,307 |
| Central of New Jersey | 671[3] | 11,329,520 | 3,370,517 | 15,509,508 | 1,555,579 | 2,180,385 | 221,123 | 4,513,681 | 289,836 | 8,760,604 | 6,748,904 | 122,625 | 754,573 | 6,116,956 | 730,624 |
| Chesapeake & Ohio Lines | 2,286[4] | 15,486,159 | 3,373,734 | 19,717,909 | 2,437,389 | 3,814,220 | 358,262 | 5,908,142 | 434,149 | 12,952,162 | 6,765,747 | 18,709 | 593,317 | 6,191,139 | —121,680 |
| Chicago & Erie | 269 | 2,398,337 | 432,732 | 3,119,743 | 471,891 | 575,837 | 144,990 | 1,480,834 | 75,233 | 2,748,785 | 370,958 | ..... | 109,639 | 261,319 | —167,673 |
| Chicago Great Western | 1,496[5] | 5,221,815 | 1,812,039 | 7,623,259 | 879,146 | 1,117,064 | 327,713 | 3,146,953 | 242,644 | 5,713,520 | 1,909,739 | 133 | 231,259 | 1,678,613 | —92,503 |
| Chicago, Rock Island & Gulf | 476[6] | 1,269,707 | 384,428 | 1,772,332 | 196,846 | 168,731 | 69,082 | 586,490 | 57,745 | 1,078,894 | 693,438 | —1,549 | 44,073 | 647,816 | 52,690 |
| Chicago, Terre Haute & Southeastern | 351[7] | 984,610 | 125,835 | 1,136,161 | 162,251 | 181,776 | 19,220 | 347,770 | 52,526 | 763,543 | 372,618 | —550 | 60,900 | 311,168 | ..... |
| Cleveland, Akron & Cincinnati † | ... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Colorado Midland | 337 | 912,808 | 174,750 | 1,197,334 | 145,802 | 218,002 | 50,196 | 499,149 | 37,862 | 951,011 | 246,323 | —1,335 | 56,000 | 188,988 | 28,664 |
| Delaware & Hudson Co.—R. R. Dept | 851[8] | 10,473,660 | 1,950,049 | 12,831,086 | 862,301 | 1,743,532 | 149,857 | 4,297,348 | 318,011 | 7,371,049 | 5,460,037 | —10,757 | 349,859 | 5,099,421 | 378,992 |
| Detroit, Toledo & Ironton | 441 | 880,741 | 106,384 | 1,062,836 | 207,401 | 133,132 | 19,302 | 503,815 | 38,358 | 902,008 | 160,828 | —23 | 43,584 | 117,221 | 87,207 |
| Duluth, South Shore & Atlantic | 624[9] | 1,167,197 | 593,837 | 1,859,314 | 289,366 | 202,134 | 68,092 | 712,658 | 65,900 | 1,338,150 | 521,164 | 8,861 | 123,666 | 406,359 | —103,064 |
| El Paso & Southwestern Co | 901 | 3,495,769 | 557,921 | 4,270,450 | 548,024 | 587,709 | 84,700 | 1,193,173 | 160,774 | 2,574,380 | 1,696,070 | —13,861 | 166,647 | 1,515,562 | —76,268 |
| Erie | 1,995 | 21,748,160 | 5,495,434 | 29,421,485 | 3,448,924 | 4,917,168 | 657,725 | 9,810,479 | 613,312 | 19,447,608 | 9,973,877 | —37,625 | 1,064,572 | 8,871,680 | —162,354 |
| Georgia | 307 | 1,357,453 | 565,396 | 2,049,209 | 169,810 | 293,988 | 78,454 | 846,707 | 55,813 | 1,444,772 | 604,437 | ..... | 14,354 | 590,083 | 87,389 |
| Georgia Southern & Florida | 395 | 732,205 | 507,357 | 1,441,264 | 140,755 | 274,782 | 50,081 | 551,235 | 65,500 | 1,082,353 | 358,911 | ..... | 72,496 | 286,415 | 5,092 |
| Hocking Valley | 352[10] | 3,630,908 | 553,482 | 4,453,042 | 555,050 | 693,855 | 58,562 | 1,326,343 | 112,809 | 2,746,619 | 1,706,423 | ..... | 272,358 | 1,434,065 | —63,886 |
| International & Great Northern § | 1,159 | 3,509,483 | 914,446 | 4,697,814 | 414,980 | 496,725 | 102,145 | 1,679,893 | 138,918 | 2,832,661 | 1,865,153 | —1,499 | 148,500 | 1,715,154 | ..... |
| Iowa Central ‡ | ... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Kanawha & Michigan | 175 | 1,713,512 | 211,538 | 1,962,386 | 230,699 | 322,660 | 15,632 | 579,407 | 46,667 | 1,195,065 | 767,321 | 23 | 62,749 | 704,595 | —35,320 |
| Lehigh & Hudson River | 96 | 879,972 | 30,335 | 923,771 | 111,601 | 128,773 | 8,670 | 315,200 | 35,339 | 599,583 | 324,188 | ..... | 24,500 | 299,688 | —7,774 |
| Louisiana Ry. & Navigation Co | 350 | 885,137 | 168,049 | 1,136,636 | 162,721 | 99,847 | 42,325 | 433,936 | 48,247 | 787,076 | 349,560 | ..... | 33,200 | 316,360 | 117,648 |
| Louisiana Western | 207 | 686,215 | 380,258 | 1,125,848 | 139,833 | 201,524 | 54,054 | 370,441 | 46,775 | 812,627 | 313,221 | 428 | 50,905 | 262,744 | —125,312 |
| Minneapolis & St. Louis | 1,585 | 3,345,321 | 1,066,766 | 4,722,274 | 574,748 | 694,510 | 126,674 | 2,106,862 | 150,720 | 3,653,514 | 1,068,760 | —300 | 204,453 | 864,007 | —445,499 |
| Minneapolis, St. Paul & S. Ste. Marie | 3,769[11] | 11,015,326 | 3,551,012 | 15,449,354 | 1,509,626 | 1,927,507 | 312,986 | 4,938,996 | 315,280 | 9,004,395 | 6,444,959 | 88,327 | 944,087 | 5,589,199 | 1,553,824 |
| Missouri, Kansas & Texas | 1,744[12] | 6,777,718 | 2,686,456 | 10,053,796 | 1,312,188 | 1,424,666 | 245,428 | 3,211,443 | 291,967 | 6,485,692 | 3,568,104 | —14,342 | 396,926 | 3,156,836 | —84,253 |
| Missouri, Kansas & Texas of Texas | 1,345[13] | 4,374,281 | 2,360,485 | 7,147,697 | 1,548,864 | 682,730 | 171,813 | 3,519,869 | 213,323 | 6,136,599 | 1,011,098 | —3,129 | 200,625 | 807,344 | —1,047,496 |
| Mobile & Ohio | 1,114 | 5,472,861 | 886,549 | 6,763,196 | 780,721 | 1,249,448 | 233,360 | 2,371,907 | 220,498 | 4,855,934 | 1,907,262 | —6,996 | 175,511 | 1,724,755 | —40,799 |
| Morgan's La. & Tex. R. R. & S. S. Co. | 404[14] | 2,154,385 | 738,799 | 3,066,884 | 370,586 | 399,878 | 95,843 | 1,204,597 | 86,937 | 2,157,841 | 909,043 | —13,511 | 130,840 | 764,692 | —276,877 |
| New Orleans Great Northern | 282 | 688,444 | 207,934 | 965,257 | 150,546 | 127,710 | 18,262 | 308,924 | 50,654 | 656,096 | 309,161 | —535 | 14,250 | 294,376 | —52,607 |
| New Orleans, Texas & Mexico | 276[15] | 673,376 | 132,384 | 858,705 | 169,270 | 99,328 | 29,355 | 379,399 | 51,562 | 728,914 | 129,761 | ..... | 3,473 | 126,318 | 5,405 |
| New York, Susquehanna & Western | 152 | 1,229,161 | 359,916 | 1,783,056 | 179,789 | 161,570 | 13,614 | 674,025 | 35,144 | 1,064,142 | 718,914 | 3,433 | 125,115 | 597,232 | 11,810 |
| Northwestern Pacific | 416[16] | 887,859 | 1,144,124 | 2,186,391 | 342,290 | 286,682 | 22,935 | 763,525 | 66,182 | 1,481,614 | 704,777 | ..... | 86,288 | 618,489 | 94,185 |
| Philadelphia & Reading | 1,014[17] | 21,037,315 | 4,224,290 | 26,442,133 | 2,371,813 | 4,853,614 | 286,559 | 8,448,022 | 467,877 | 16,427,885 | 10,014,248 | 188,349 | 632,720 | 9,569,877 | 189,580 |
| Pittsburgh, Shawmut & Northern | 278[18] | 753,707 | 63,395 | 830,547 | 95,842 | 171,784 | 7,791 | 241,955 | 28,077 | 545,449 | 285,098 | ..... | 11,041 | 274,057 | 128,580 |
| Port Reading | 21 | 716,779 | ..... | 727,049 | 59,424 | 1,271 | 218 | 216,832 | 815 | 278,560 | 448,489 | 19,034 | 26,600 | 440,923 | —74,177 |
| Richmond, Fredericksburg & Potomac | 83 | 676,406 | 515,166 | 1,366,842 | 142,425 | 175,462 | 19,853 | 512,908 | 41,664 | 892,312 | 474,530 | ..... | 7,658 | 466,872 | 27,434 |
| Rutland | 468 | 1,087,933 | 752,098 | 2,078,641 | 247,342 | 304,121 | 51,923 | 805,989 | 46,833 | 1,456,208 | 622,433 | ..... | 77,645 | 544,788 | 7,115 |
| St. Louis & San Francisco | 4,731 | 15,382,846 | 6,892,781 | 24,022,118 | 2,977,329 | 3,109,834 | 628,714 | 8,371,144 | 699,343 | 15,786,364 | 8,235,754 | ..... | 1,119,458 | 7,116,296 | 54,894 |
| St. Louis, Brownsville & Mexico | 509[19] | 823,506 | 415,369 | 1,340,666 | 285,503 | 90,353 | 20,178 | 460,312 | 55,593 | 911,939 | 428,727 | ..... | 38,785 | 389,942 | 203,645 |
| St. Louis Merchants' Bridge Terminal | 9 | ..... | 2,181 | 1,000,998 | 170,905 | 70,848 | 3,087 | 543,969 | 35,721 | 824,530 | 176,468 | ..... | 40,932 | 135,536 | 131,406 |
| St. Louis, San Francisco & Texas | 243 | 538,066 | 204,601 | 792,500 | 129,536 | 110,110 | 21,380 | 346,890 | 32,626 | 640,542 | 151,958 | ..... | 7,106 | 144,852 | 107,469 |
| St. Louis Southwestern of Texas | 703 | 1,920,799 | 660,751 | 2,761,007 | 362,230 | 562,966 | 84,715 | 1,026,977 | 122,071 | 2,158,959 | 602,048 | —1,480 | 73,661 | 526,907 | 354,392 |
| San Antonio & Aransas Pass | 727 | 1,963,274 | 747,352 | 2,869,158 | 455,309 | 325,423 | 39,498 | 1,001,636 | 69,008 | 1,890,874 | 978,284 | ..... | 77,000 | 901,284 | 97,136 |
| Seaboard Air Line | 3,053[20] | 8,641,606 | 2,959,517 | 12,961,160 | 1,891,138 | 1,872,795 | 478,878 | 4,673,127 | 399,991 | 9,254,929 | 3,706,231 | —7,275 | 522,000 | 3,176,956 | —281,331 |
| Sunset | 59 | 451,722 | 114,177 | 590,436 | 82,930 | 21,655 | 331 | 216,958 | 23,697 | 345,571 | 244,865 | ..... | 23,728 | 221,137 | —115,397 |
| Tennessee Central | 293 | 606,821 | 240,905 | 900,039 | 159,813 | 125,491 | 36,658 | 326,048 | 59,389 | 707,399 | 192,640 | ..... | 29,455 | 163,185 | —116,489 |
| Terminal R. R. Ass'n of St. Louis | 35[21] | ..... | 1,715 | 1,583,632 | 247,182 | 163,938 | 4,972 | 578,251 | 40,840 | 1,035,183 | 548,449 | 60,532 | 194,368 | 414,413 | —140,497 |
| Texas & Pacific | 1,884 | 7,434,799 | 2,583,433 | 10,670,311 | 1,066,617 | 1,363,138 | 205,157 | 4,317,190 | 313,586 | 7,265,688 | 3,404,623 | 35,519 | 467,097 | 2,902,007 | 373,478 |
| Toledo & Ohio Central | 440[22] | 2,672,452 | 406,530 | 3,227,892 | 505,225 | 420,821 | 47,287 | 1,065,769 | 58,065 | 2,097,167 | 1,130,725 | —6,503 | 144,116 | 980,106 | —111,153 |
| Trinity & Brazos Valley | 462 | 1,333,398 | 268,214 | 1,654,197 | 262,112 | 210,675 | 68,914 | 745,925 | 80,409 | 1,368,035 | 286,162 | ..... | 32,339 | 253,823 | 107,244 |
| Ulster & Delaware | 128 | 389,407 | 259,984 | 681,701 | 92,287 | 75,964 | 10,164 | 274,054 | 17,556 | 470,025 | 211,676 | 672 | 23,100 | 189,248 | —13,962 |
| Virginia & Southwestern | 240[23] | 891,138 | 100,704 | 1,016,934 | 121,622 | 202,598 | 12,770 | 298,270 | 27,558 | 662,818 | 354,116 | ..... | 33,592 | 320,524 | 85,727 |
| Wabash | 2,514 | 11,524,978 | 4,463,712 | 17,342,886 | 2,047,143 | 2,917,145 | 558,441 | 6,916,163 | 524,781 | 12,963,673 | 4,379,213 | —9,093 | 493,352 | 3,876,768 | —898,303 |
| Washington Southern | 35 | 224,912 | 255,689 | 640,168 | 77,448 | 68,884 | 8,514 | 250,430 | 19,144 | 424,470 | 215,748 | ..... | 22,715 | 193,033 | —24,474 |
| Western Pacific | 935 | 2,493,286 | 669,714 | 3,261,369 | 602,580 | 291,315 | 188,744 | 1,319,518 | 157,230 | 2,559,387 | 701,982 | —23,302 | 101,050 | 577,630 | ..... |
| Western Ry. of Alabama | 133 | 470,358 | 296,625 | 833,550 | 132,604 | 154,170 | 37,456 | 223,224 | 42,973 | 590,427 | 243,123 | 33 | 32,286 | 210,870 | 18,976 |

† Included in Penna. Co., January, 1911. ‡ Leased to Minn. & St. Louis, December 20, 1911. § Figures shown here are for the period September 16, 1911, to January 31, 1912.
Operated in previous period—[1] 354; [2] 4,434; [3] 631; [4] 2,225; [5] 1,495; [6] 470; [7] 350; [8] 819; [9] 610; [10] 350; [11] 3,763; [12] 1,736; [13] 1,348; [14] 348; [15] 264; [16] 376; [17] 1,022; [18] 240; [19] 501; [20] 3,046; [21] 34; [22] 444; [23] 242.
— Indicates Deficits, Losses and Decreases.

### Conference Rulings.

An annual pass cannot be issued to an employee of a boiler compound manufacturing company, although free transportation may be given such employee in specific instances where he is making a trip for instruction of railway employees only.

Neither a railway nor its agents or employees may act as forwarding agents for shippers.

When reparation is awarded informally by the commission after new joint rates and new minimum weight has been ordered, it will be on the basis of the newly established rate and minimum weight.

In the case where two small cars have been furnished where the shipper applied for one large car, all railways party to the joint rate under which the shipment moved must give the shipment all the privileges in transit, reconsignment, switching charges, etc., that would be given it if it moved in one large car.

Employees of a restaurant in a union station are not entitled to free transportation.

Where two railways interchange traffic by using a switching road that makes a physical connection and absorb the switching charge, the switching road does not need to concur in the through rate if its switching charge is on file.

A trainman required by his duties to send or receive orders affecting the movement of trains comes under the hours-of-service law as applied to telegraph or telephone operators, but a trainman who has been on duty for more than nine hours or for more than 13 hours is not prohibited from using the telegraph or telephone to meet an emergency.

### Switching Charges of Industrial Railways Discussed.

*Alan Wood Iron & Steel Co. v. Pennsylvania Railroad et al. Opinion by Commissioner Clark:*

The railways serving the steel plant at Ivy Rock, Pa., having built interchange tracks under an agreement with the complainant, refused to "spot" the cars on the plant tracks, and will make delivery only to the interchange tracks. The commission discusses, but does not pass on, the question of whether or not an allowance for switching charges is lawful, but finds that in the present instance the agreements as to the cost of building the interchange tracks are such that the complainant is not discriminated against because the railways perform the switching service at some of its competitors' plans. If, however, it were not for these special circumstances, the commission insists that if a railway perform the switching service for one industry it must do the same for its competitors. (22 I. C. C., 540.)

## STATE COMMISSIONS.

The Arkansas commission has ordered that after May 1 of this year railways must dispense with the public drinking cup.

Charles N. Mann, a member of the Pennsylvania commission, died at his home near Philadelphia March 7, at the age of 72.

The New York Public Service Commission, Second district (up state), has issued a circular calling for information from shippers and consignees of freight as to the practice of railways in the weighing of carload and L. C. L. shipments. The New York commission is co-operating with the Interstate Commerce Commission in a general investigation of this subject.

The Louisiana railway commission has promulgated a rule that no passenger trains operating in the state shall be discontinued without the commission's consent. Another rule which has just been adopted, requires that "all railway companies operating passenger trains in Louisiana shall start and run all passenger trains in accordance with advertised schedules, unless prevented from doing so by accident or wreck, and shall furnish sufficient accommodations on such trains to properly seat all passengers who within a reasonable time previous to their departure offer themselves for transportation; provided, that all main line trains shall be held not to exceed thirty minutes, and all branch line trains shall be held not to exceed one hour at points of origin or junction points for connections with trains on other lines."

### Annual Report Oklahoma Commission.

The Oklahoma Corporation Commission has issued its annual report for the fiscal year 1911 containing a review of the work of the commission. The report shows that a large number of orders reducing rates have been enjoined by the courts. The state 2-cent fare law is pending before the Supreme Court of the United States; and reduced freight rates on coal, lumber, grain, cotton, cottonseed, oil, brick, lime, cement, sand, gravel, stone, canned goods and fruits and vegetables also have been enjoined by the federal court and the cases are pending before the Supreme Court. An order reducing express rates by approximately 25 per cent. has been enjoined by the State Supreme court, which also declared invalid the commission's reduction of telegraph rates. A reduction of approximately 25 per cent. in live stock rates has been appealed from, but is still effective. The commission states that it has secured refunds to shippers, amounting to from $15,000 to $20,000, for overcharges in freight rates. Two hundred and nine complaints were filed with the commission during the year, 160 orders were issued and 186 informations, charging violation of the commission's orders, were filed. Penalties were imposed in twenty cases. The report shows that since March 3, 1909, 292.8 miles of railway have been constructed in the state. During the year 112 persons were killed and 1,049 were injured on steam railways; 21 persons were killed and 65 injured at grade crossings.

## COURT NEWS.

In the United States Court at Grand Rapids, Mich., the grand jury has returned indictments against the Grand Rapids & Indiana for illegal payment of rebates, and against the Chicago, Kalamazoo & Saginaw for making false entries of freight. Twelve lumber shippers are also indicted.

The United States circuit court of appeals, at New Orleans, March 5, reversed the decision of a lower court which had decided for the defense in a suit against the Vicksburg, Shreveport & Pacific in connection with a lynching which occurred at Tallulah, La., in 1907. The widow of the man lynched sued the railway as one of the conspirators, on the allegation that a special train had been run to carry the mob to Tallulah. The court of appeals now says that the case must be again taken up and be tried by a jury.

The Colorado & Southern and the Chicago, Burlington & Quincy have filed briefs in the Supreme Court of Colorado in the case involving the authority of the state railway commission to reduce rates on coal from northern Colorado to Denver, declaring that the state railway commission law of 1907 is unconstitutional and that even if it is constitutional it does not give the state commission the power to fix rates. The district court, from which an appeal was taken by the Consumers' League, held that the law was unconstitutional.

The district court of East Baton Rouge, La., has given judgment for $1,000 against the Yazoo & Mississippi Valley for violation of the State Railway Commission's rule requiring trains to stop before crossing another railway at grade and to send a flagman ahead to see if the way is clear. This judgment affirms an order of the State Railway Commission imposing a fine on the road because of a collision in June, 1908, near Baton Rouge, when one passenger was killed and a number were injured; but the amount of the fine is reduced from $5,000 to $1,000. The view at this crossing was obstructed by a clump of trees. The same penalty was imposed on the other road, the Louisiana Railway & Navigation Company.

### United States Commerce Court—Minority Opinion in Louisville & Nashville Case.

*Judge Mack dissenting:*

The salient facts briefly stated are that prior to August, 1907, the through rates on certain classes from New Orleans to Montgomery exceeded the combination of rates in force from New Orleans to Mobile and Pensacola, respectively; and from these places to Montgomery. All of the rates had been in force for many years. No change has been made in the rates on that part of the road between Mobile and Pensacola, respectively, and Montgomery, but in August, 1907, the rates from New Orleans to Mobile and to Pensacola, were advanced exactly enough to make the combination on these points equal to the through rate from New Orleans to Montgomery. While

the railway attempts to justify this advance by the assertion that the former rate was unreasonably low, having been put into effect many years before in order to cut out water competition, nevertheless it is admitted that the immediate cause of the advance was the announcement by the commission of the rule that a through rate must not exceed the combination of the locals. To comply with the rule, it was necessary either to reduce the through rate from New Orleans to Montgomery to the sum of the locals or to raise one or both of the latter. The railway chose the latter alternative; the commission, by its order, endeavored to compel it to adopt the former.

The commission could do this only if it found that the new rates from New Orleans to Mobile and Pensacola, respectively, and the unchanged rate from New Orleans to Montgomery were unreasonably high. If, on a review of the record before the commission, this court finds that there was no substantial evidence on which to base such a conclusion, it would be our duty to annul the order, inasmuch as the power of the commission to reduce rates to a reasonable figure is conditioned on the opinion of the commission, formed after a full hearing, that the tariff rate is unreasonably high; not its arbitrary and uncontrolled opinion, but its deliberate judgment based on substantial evidence produced at the hearing prescribed by the act.

While this principle is that adopted in the opinion of the court, I differ with my brethren in the application of it to the facts of this case. Whatever view I might have taken as to the reasonableness of the tariff rates had I been a member of the commission, I cannot find that there is no evidence to support the conclusions reached by it that they are unreasonably high.

Let us first consider the raised rates from New Orleans to Mobile and Pensacola. While, as the majority of the court state, there is no presumption that they are unreasonable merely because the old rates have been raised, yet there is likwise no presumption that they are reasonable merely because the carriers have put them into effect. When a rate is attacked immediately after it is made, there is no presumption either for or against its reasonableness. If it has been in force for some time and traffic has moved freely under it, a presumption does arise that it is reasonable. That presumption would be sufficient to make out a prima facie case in favor of the reasonableness of the rate to which it applied, and therefore to shift the burden of going forward with some evidence that it is unreasonable.

Apply these fundamental principles to this case. There is no presumption one way or the other as to the new rates. The ultimate burden of proof, at the time of this hearing and until the amendment of 1910, was on the shippers to show their unreasonableness. The absence of any presumption that they are reasonable was demonstrated when it was shown that they were put into effect just prior to this complaint; and a prima facie case that the old rates are reasonable and the raised rates therefore unreasonable was made out when it was proved that the former had been in force for many years.

The burden of going forward with evidence that will meet this prima facie case, or in other words, the obligation to give some valid explanation of the increase, now devolves on the carrier. This may be satisfied by showing that the old rates were compelled by water competition and that they are unreasonably low by at least the amount of the increase. But if the shippers prove that these water competitive rates had continued for many years after actual water competition in any real sense had ceased, and under conditions clearly negativing any danger of a recurrence thereof, the presumption of their inherent reasonableness again arises, and may, in the discretion of the commission, be deemed sufficient proof thereof.

The testimony before the commission tended strongly to show that no renewal of water competition was feasible after it had once ceased to be a factor in the transportation situation because of labor conditions, wharf control by the railways, and the justifiable fear that an investment in steamers by the shippers or others would be rendered worthless, inasmuch as the railways would cut their rates to any extent necessary to secure the business. It must be remembered in this connection that at that time and until the amendment of 1910 railways could cut their rates without restraint in order to destroy competition, and after accomplishing that purpose raise them again without the consent of the commission.

On these considerations alone and disregarding any other evidence the action of the commission in finding the new rate unreasonably high to the extent of the increase over the old rate from New Orleans to Mobile and Pensacola, respectively, ought, in my judgment, to be sustained as against the charge of arbitrary or unjustified action.

We come next to the consideration of the New Orleans-Montgomery rate. A presumption of its reasonableness arises from the fact that it had been long in force. To overcome this presumption, the shippers showed, first, that it was customary both on this and other roads not to charge more for the through rate than the combination of locals, although admittedly this custom had not been enforced for this particular through traffic; secondly, that the commission had now adopted a rule in accordance with the custom.

Whatever the concession of the counsel for the government may mean—and in my opinion it does not go so far as the majority of the court believe—the fact alone that the through rate exceeds the combination of locals is, in my judgment, an all-sufficient reason for a reduction to the extent of the excess. There may be peculiar and extraordinary circumstances which will cause the commission to refrain from compelling such a reduction, but ordinarily, and in the present case, the increased cost to the carrier of handling two local shipments and the economic waste involved therein as against a single through shipment, if the shipper should exercise his legal right of shipping from New Orleans to Mobile and then from Mobile to Montgomery on the local rates, amply justified the commission in promulgating its rule and in enforcing it by the reduction of the New Orleans-Montgomery through rate. Congress, moreover, has now, by the amendment of 1910 to section 4 of the act to regulate commerce, given this rule the force of law.

That the reduction ordered by the commission in the New Orleans-Montgomery rate was exactly enough to make the through rate equal the combination of locals as reduced is no more peculiar than that the increase by the carrier in the local New Orleans-Mobile and New Orleans-Pensacola rates was exactly enough to make the combination of locals as increased equal the former through rate. And when the principal witness of the carrier testifies that in his judgment the raised rates "from New Orleans to Mobile are not too low, and I do not think they are too high," in other words, that they are exactly right, and he so testifies notwithstanding his frank admission that the cause of the raise was to check the application of the new rule to the old rates, the commission can not, in my judgment, be said to have acted arbitrarily in not accepting this view of the result effectuated by the raise.

While I differ with my brethren in their criticism of a number of statements made in the report of the commission, it is unnecessary to discuss them here. For example, the view taken by the commission of the Cooley adjustment is fully justified, in my judgment, by the fact that the relation of rates thereby established in 1886, was departed from not as to some, but as to a great many commodity rates and that, too, at many times; even as to class rates, there were departures in 1896 and in 1905.

Even though some errors of fact may be found in the report, these are clearly not the real basis of the order. Moreover, if any inequalities or undue preferences as against other localities result from the order of the commission, they may be remedied on proper complaint, by the proper parties, to the commission.

The majority opinion is confined to a single question, and I have for that reason limited this dissent to a consideration of it. Without, therefore, discussing the many interesting questions of confiscation and jurisdiction presented in the briefs and oral arguments, it suffices at this time to state that, in my opinion, the other grounds urged against the order of the commission are equally unavailing and that the petition should be dismissed.

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The estimated cost of the proposed line from Henty, New South Wales, to Daysdale, exclusive of land and compensation, is $1,070,655. This line would be 46 miles long. The route lies for the most part through privately owned land. It is argued that in view of the fact that Daysdale would be only 12 miles from the line now in course of construction to Clear Hills, a better division of the country could be made by deviating the proposed line about eight miles to the east of Daysdale and extend it to Mulwala on the Victorian border. By this route, aided with a cross line from Berrigan via Saverake, the greater portion of the agricultural land and settlement at present unserved will be brought within ten miles of railway communication. The cost of the extension to Mulwala, a distance of 30 miles, is estimated at $690,750.

# Railway Officers.

## ELECTIONS AND APPOINTMENTS.

### Executive, Financial and Legal Officers.

George C. Conn, freight traffic manager of the Pere Marquette at Detroit, Mich., has been elected vice-president, succeeding A. Patriarche.

Edgar M. Morsman, Jr., has been appointed general attorney for Nebraska of the Missouri Pacific, with office at Omaha, Neb., succeeding F. A. Brogan, resigned.

E. C. Tarrant, treasurer of the San Antonio & Aransas Pass, with office at San Antonio, Tex., having resigned, H. F. Smith, assistant treasurer has been appointed acting treasurer.

### Operating Officers.

M. J. Lynch, general yard master of the Peoria & Pekin Union, has been appointed trainmaster, with office at Peoria, Ill.

F. R. Rockwell, general superintendent of the Denver & Rio Grande at Pueblo, Colo., has had his office removed to Denver, Colo.

W. B. Denham has been appointed general manager of the Georgia & Florida, with office at Augusta, Ga., succeeding J. M. Turner, resigned.

W. D. Danley has been appointed general superintendent of the Ann Arbor Railroad, with office at Owosso, Mich., succeeding K. A. Gohring, superintendent, resigned.

W. A. Mather, resident engineer of the Canadian Pacific at Winnipeg, Man., has been appointed acting superintendent, with office at Kenora, Ont., succeeding to the duties of J. Brownlee, deceased.

R. L. Barrett, trainmaster of the Atlanta, Birmingham & Atlantic, has been appointed assistant superintendent of the Brunswick division, with office at Fitzgerald, Ga., and his former position has been abolished.

Robert E. Mills has been appointed inspector of passenger train and station service of the Illinois Central and the Yazoo & Mississippi Valley, with headquarters at Chicago. His duties will relate to the care and convenience of passengers.

J. R. Neff, assistant trainmaster of the Baltimore & Ohio Southwestern at Chillicothe, Ohio, has been appointed trainmaster, with office at that place, succeeding G. W. Plumly, assigned to other duties; and R. R. Schwarzell succeeds Mr. Neff.

J. A. Small has been appointed superintendent of the Guadalajara division of the Southern Pacific of Mexico and the Sonora Railway, with office at Guadalajara, Jalisco, Mex., succeeding J. B. Sparks, assigned to other duties on account of ill health.

A. T. Lowmaster has been appointed general agent of the operating department of the Chesapeake & Ohio and the Chesapeake & Ohio of Indiana, with headquarters at Chicago, and the office of superintendent of terminals at that place has been abolished.

Frank Hooker Alfred, general superintendent of the Cincinnati, Hamilton & Dayton, has resigned to become assistant general manager of the Pere Marquette, with office at Detroit, Mich., and the office of W. D. Trump, general superintendent of the Pere Marquette at Detroit, will be abolished on April 1.

J. H. Taylor, general superintendent of the Central district of the Great Northern at Great Falls, Mont., has been appointed general superintendent of the Lake district, with office at Superior, Wis., succeeding D. M. Philbin, whose entire time will be hereafter required in connection with the iron ore properties. C. O. Jenks, superintendent of the Butte division at Great Falls, succeeds Mr. Taylor, and P. C. Allen, superintendent of the Dakota division at Grand Forks, N. D., succeeds Mr. Jenks, C. E. McLaughlin, master mechanic at Breckenridge, Minn., succeeds Mr. Allen. W. Clarke, assistant division superintendent at Spokane, Wash., has been assigned to duties in the office of the general superintendent at Seattle.

### Traffic Officers.

F. O. Bender has been appointed traveling freight agent of the Baltimore & Ohio, with office at Philadelphia, Pa.

N. H. Reed has been appointed assistant general advertising agent of the Atchison, Topeka & Santa Fe, with office at Chicago.

C. E. Arney has been appointed western immigration and industrial agent of the Northern Pacific, with office at Spokane, Wash.

C. E. Henson has been appointed soliciting freight and passenger agent of the Galveston, Houston & Henderson, with office at Galveston, Tex.

G. R. Angell has been appointed commercial agent of the Rock Island Lines, with office at Dallas, Tex., succeeding T. H. Wilhelm, promoted.

E. M. Jordan has been appointed freight soliciting agent of the Southern Railway, with office at Selma, Ala., succeeding H. G. Duke, resigned.

H. L. McLaughlin has been appointed commercial agent of the Chicago, Milwaukee & Puget Sound, with office at Everett, Wash., succeeding A. G. Bantly.

Tracey Howard has been appointed district passenger and freight agent of the Northern Pacific, with office at Montreal, Que., succeeding G. W. Hardisty, deceased.

William C. Barnes has been appointed assistant general freight agent of the El Paso & Southwestern System and the Morenci Southern Railway, with office at El Paso, Tex.

B. R. Marsales, city freight agent of the Canadian Northern, at Edmonton, Alta., has been appointed contracting freight agent, with office at Brandon, Man., succeeding T. J. Petterson, resigned.

D. T. Berry has been appointed commercial agent of the Chicago, Milwaukee & St. Paul, with headquarters at Los Angeles, Cal., succeeding E. K. Garrison, resigned to become district freight and passenger agent of the Chicago, Milwaukee & Puget Sound at Portland, Ore.

W. A. Lally has been appointed general agent of the New York Despatch Refrigerator Line, the National Despatch Refrigerator Line and the Chicago, New York & Boston Refrigerator Company, with office at Chicago, succeeding F. Meinhardt, resigned to engage in other business.

Roy Terrell, assistant general freight and passenger agent of the New Orleans, Texas & Mexico, the Beaumont, Sour Lake & Western and the Orange & Northwestern at New Orleans, La., has been appointed also general freight and passenger agent of the New Orleans, Mobile & Chicago, with office at New Orleans. N. C. Barnett, commercial agent, and Mark Antony, city passenger and ticket agent of the Frisco lines at New Orleans, have had their jurisdiction extended over the New Orleans, Mobile & Chicago. J. W. McCann has been appointed traveling freight agent and E. B. Wood has been appointed soliciting freight agent, all with headquarters at New Orleans.

### Engineering and Rolling Stock Officers.

Walter T. Krausch has been appointed engineer of buildings of the Chicago, Burlington & Quincy, with office at Chicago.

C. K. Stewart has been appointed master mechanic of the Missouri Pacific, with headquarters at Coffeyville, Kan., succeeding T. M. Vickers, resigned.

Edward Thomas has been appointed division foreman of the Oregon-Washington Railroad & Navigation Company, with office at La Grande, Ore., succeeding J. H. Watson.

A. C. Mackenzie, assistant engineer of the Canadian Pacific at Montreal, Que., has been appointed engineer maintenance of way of the Eastern Lines with office at Montreal.

S. J. Rufer, roadmaster of the Rock Island Lines at El Dorado, Ark., has been appointed general foreman of track laying of the Idaho Northern, with headquarters at Nampa, Idaho.

T. E. Cannon, master mechanic of the Lake district of the Great Northern at Superior, Wis., has been appointed general master mechanic of the Lake district, with office at Superior, a new office, and B. E. Osgard succeeds Mr. Cannon. S. J. Fero has been appointed master mechanic, with office at Breckenridge, Minn., succeeding C. E. McLaughlin, promoted.

## OBITUARY.

W. J. Healy, auditor of the Atchison, Topeka & Santa Fe Coast Lines, with office at Los Angeles, Cal., died at that place on March 10.

# Equipment and Supplies.

## LOCOMOTIVE BUILDING.

THE NORFOLK & WESTERN is figuring on 25 Mallet locomotives.

THE JAPANESE GOVERNMENT is in the market for a number of locomotives.

THE LAKE SUPERIOR TERMINAL & TRANSFER COMPANY has ordered 2 switching locomotives from the Baldwin Locomotive Works.

THE LOUISIANA & ARKANSAS has ordered 2 eight-wheel locomotives and 2 ten-wheel locomotives from the Baldwin Locomotive Works.

THE WESTERN MARYLAND has ordered 15 consolidation locomotives from the American Locomotive Co., and 10 Pacific type locomotives from the Baldwin Locomotive Works.

THE CHICAGO, MILWAUKEE & ST. PAUL, mentioned in the *Railway Age Gazette* of March 1 as having ordered 30 Pacific type locomotives from the American Locomotive Company, has increased this order to 50 Pacific type locomotives. This company is now taking prices on 50 mikado locomotives.

THE DELAWARE, LACKAWANNA & WESTERN has ordered 15 mikado locomotives and 7 Pacific type locomotives from the American Locomotive Company, and 6 eight-wheel switching locomotives from the Lima Locomotive & Machine Works. The mikado locomotives will have 28-in. x 30-in. cylinders, 63-in. driving wheels, and in working order will weigh 314,000 lbs. The Pacific type locomotives will have 25-in. x 28-in. cylinders, 73-in. driving wheels, and in working order will weigh 281,000 lbs. The Pacific type locomotives will be equipped with superheaters. The switching locomotives will have 22-in. x 28-in. cylinders.

## CAR BUILDING.

THE ULSTER & DELAWARE is in the market for 75 flat cars.

THE NEW YORK, NEW HAVEN & HARTFORD has ordered a number of motor cars from the Standard Steel Car Company.

THE WABASH has increased its inquiry for passenger equipment from 20 to 24, including 12 combination passenger and baggage cars, 8 chair cars and 4 passenger coaches.

THE WESTERN MARYLAND has ordered 18 coaches, 6 combination mail and express cars, 4 baggage cars and 2 postal cars from the Barney & Smith Car Co.

THE CHICAGO, MILWAUKEE & ST. PAUL will build 500 automobile cars at its own shops in addition to the 470 previously reported for the Chicago, Milwaukee & Puget Sound.

## IRON AND STEEL.

THE WABASH has ordered 20,000 tons of rails from the Illinois Steel Company.

THE INTERBOROUGH RAPID TRANSIT COMPANY, New York, is in the market for 5,000 tons of rails.

THE CHICAGO, MILWAUKEE & ST. PAUL has ordered 3,000 tons of bridge material from the American Bridge Company.

THE PENNSYLVANIA LINES WEST have ordered 380 tons of bridge material from the Chicago Bridge & Iron Works.

THE CHESAPEAKE & OHIO has ordered 5,000 tons of rails from the Maryland Steel Company, and from 10,000 to 15,000 from the Carnegie Steel Company.

THE CHICAGO & NORTH WESTERN has ordered 3,000 tons of bridge material from the American Bridge Company for the Chicago, St. Paul, Minneapolis & Omaha.

GENERAL CONDITIONS IN STEEL.—The coal strike in England and the fear of a coal strike in this country have tended to unsettle the conditions in the steel industry. It has been expected that there would be an improvement in the buying movement by this time. This is, however, delayed, but probably only for a short time. The Steel Corporation continues to operate at almost 90 per cent. of its capacity and the railways are beginning to enter the market more heavily, especially for bridges.

## SIGNALING.

*New Installations of Block Signals, Interlocking, Telephones for Train Despatching, Etc.*

The United States Electric Company, of New York and Chicago, has delivered to the Norfolk & Western 78 telephone train despatching outfits, with Gill selectors. The same concern has recently delivered 76 similar outfits to the Baltimore & Ohio. Both of these roads were already using large numbers of the United States telephones and selectors.

The New York State Public Service Commission, First district, has ordered a number of electric railways to install "automatic electric block signals" on their single-track lines; six companies on Long Island, one in the borough of the Bronx, and two on Staten Island. The order requires signals at all turnouts and at all points where a double-track line converges into a single track; and evidently contemplates a wire-circuit system with trolley contact, with block sections extending from meeting point to meeting point. The order is to be complied with by June 1, next, but it does not apply to lines which are to be double-tracked within one year.

The Missouri Pacific has decided to instal the block system (manual) on about 3,000 miles of its lines and already considerably over 1,000 miles of road has been equipped. The system has been completed and in operation for some weeks over the entire main line of the Iron Mountain from St. Louis to Texarkana, 490 miles, and also over the main line of the Missouri Pacific from St. Louis to Osawatomie, Kan., 60 miles beyond Kansas City. Work is being rapidly pushed from Osawatomie to Pueblo, Colo., the western terminus of the Missouri Pacific main line, and within the next month or two it will be completed, and thus both the Missouri Pacific and Iron Mountain main through lines will have block signals over their entire length. Other sections equipped or soon to be equipped are: Kansas City to Omaha; Osawatomie via Coffeyville and Fort Smith, to Little Rock, and Little Rock, via McGehee, to Alexandria, La., a total distance of 759 miles from Osawatomie. Another section is that from Dupo, Ill., to Paragould, Ark., 242 miles. This is jointly operated by the Iron Mountain and the Cotton Belt.

The Lehigh Valley now has in use over 700 portable telephones, having bought approximately that number from the Western Electric Company during the past year. A portable telephone set is carried on every train, freight and passenger, and also on every work train; every bridge repair gang has one, and also some of the track repair gangs. The saving in the time of work trains, and in connection with other work on the main tracks has been so marked that an officer of the road says that the telephones already have more than paid for themselves. With all of these telephone sets there is carried a "fish pole" connection, enabling the men in charge to connect with the telephone line at any point along the road. The selector calling apparatus, which is used at the stations in connection with the train wire, is in some cases made available for calling the track foreman at night. At a station where no one is on duty at night in the office, a wire is run to the track foreman's dwelling and a connection made so that in case of need the despatcher can call the foreman, in the same way that the station agent is called during the day time. This arrangement has been adopted on the theory that the track foreman is more likely to be wanted at night than is the station man; but in case of need the track foreman can be called upon to go and notify the station agent.

The proposal for the Minusinsk railway, Russia, has been submitted in two forms—either from Minusinsk to Atchinsk or from Minusinsk to Itakka, on the Siberian railway. The total length of the line will be 245 miles in the former case; 228 miles in the latter. It would be important as a grain-carrying line; besides which it would serve regions rich in timber, salt, gold, copper and iron. The line would also facilitate communication with Mongolia.

# Supply Trade News.

Phillip H. Ryan has resigned his position in the mechanical department of the New York Central & Hudson River to enter the railway department of the American Steam Gauge & Valve Manufacturing Company, Boston, Mass.

The U. S. Metal & Manufacturing Company, New York, has changed the name of its one-piece steel ladder for box cars, etc., from "Interstate" to "Safety." This change was made owing to the fact that after marketing a large number of ladders the company found that the name was similar to that of a ladder made by another concern.

The Canton Manufacturing Company, Canton, Ohio, is doubling the floor space of its plant by enlarging the present buildings and by erecting new ones. This work was begun February 15, and it is expected to be completed by May 1. Also, an additional factory has been leased for the manufacture of Multoplex filing cabinets, which were placed on the market last November.

The Detroit Steel Products Company, Detroit, Mich., has received a large government contract for Fenestra windows for all of the shop buildings of the new United States naval station at Pearl Harbor, Hawaii. The contract includes 50,000 sq. ft. of steel windows. The navy department has used Fenestra windows in many of its new shop buildings, and it has become a standard specification for much government work.

Judge Day of the United States district court at Cleveland on March 4 rendered an opinion dismissing the suit of the Railroad Supply Company against the Elyria Iron & Steel Company for alleged infringement of the Wolhaupter patents on railway tie plates. The court agreed with the opinion of Judge Kohlsaat of the circuit court at Chicago in a case involving the same claims and found that the defendant's device did not infringe on the Wolhaupter patents.

Frederick Maley, formerly with the Baldwin Locomotive Works, Philadelphia, Pa., has been made superintendent of the oxy-acetylene department of the Alexander Milburn Company, Baltimore, Md. The Milburn company has recently equipped several locomotive cranes for the Maryland Steel Company, Sparrows Point, Md., with its new steam acetylene generator, which utilizes the waste steam from the boiler, supplying a number of searchlights and allowing night work to be carried on satisfactorily. The Cincinnati, New Orleans & Texas Pacific has also equipped one of its Industrial wrecking cranes with the same system.

The management of the Permanent Manufacturers' Exhibit of Railway Supplies and Equipment in the Karpen building, Chicago, has arranged a program of entertainment, beginning on Saturday night of this week and continuing next week, while the convention of the American Railway Engineering Association is being held. The first meeting of a railway association in the assembly rooms in connection with the exhibit, which have been offered free of charge to railway and supply associations, was held on Monday evening, when the Chicago Car Foremen's Association met there. The Car Clerks' Association will hold its first regular monthly meeting in the rooms on April 1, and the Western Railway Club will meet there Tuesday night of next week.

## TRADE PUBLICATIONS.

Wire Rope and Wire.—John A. Roebling's Sons Company, Trenton, N. J., has issued a very complete illustrated catalog, describing its iron, copper, brass and steel wire, galvanized and hard copper telegraph and telephone wire and miscellaneous products, with descriptions of some principal installations.

Cement Poles.—The Standard Cement Pole Company of America, New York, has issued a booklet describing the Rubello-Santi system of making reinforced cement poles. The distinctive feature is said to be the method by which the reinforcement is held in position and uniformly spaced. The reinforcing member consists of a number of metallic rings embedded concentrically in the concrete and united by parallel steel rods running lengthwise and crosswise of the pole through perforations in the rings.

# Railway Construction.

### New Incorporations, Surveys, Etc.

Atchison, Topeka & Santa Fe.—This company has appropriated $1,125,000 for carrying out betterments and improvements on the Gulf, Colorado & Santa Fe. This is in addition to the amount to be spent for the construction of new lines during the year. The work includes new terminal yards, revision of grades, new rails, bridges, trestles, culverts, elimination of grade crossings, new stations and shops, engine houses and turntables. C. A. Morse, chief engineer, Topeka, Kan.

Batesville & Northeastern.—An officer writes that this company has recently been organized, and that as soon as it receives its charter will begin surveys for a 40-mile line, to be built from Batesville, Ark. Virgil W. Cook, president; N. Adler, vice-president; W. Ramsey, treasurer, and S. Deener, secretary, Batesville.

Black Mountain Railway.—An officer writes regarding the reports that an extension is to be built to Asheville, N. C., that no plans have been made for such an extension. The company is now building about 25 miles of line into the timber section of the Black mountains in North Carolina. C. G. Ruffin, Burnsville, N. C., may be addressed.

British Columbia Electric.—This company is building an extension on Vancouver island, from Victoria northerly through the Saanich peninsula, to Deep Cove, about 23 miles, and a branch will be built to connect with Union Bay, where a wharf is to be built. A contract was given to Moore & Pethick last year for grading 18 miles, and construction work is now well under way. R. H. Sperling is general manager.

Buffalo, Rochester & Pittsburgh.—An officer writes that a contract has been given to the Miller Construction Company, Lock Haven, Pa., for grading and masonry work on a five-mile extension of the Jacksonville Mine line in Indiana county, Pa. The same company has been given a grading contract for revision work on the main line, near West Mosgrove, Pa. E. F. Robinson, chief engineer, Rochester, N. Y.

Canadian Northern.—A bill has been introduced in the Saskatchewan legislature to incorporate the Canadian Northern Saskatchewan, and to grant that company authority to build lines in the province of Saskatchewan as follows: From Kipling west to New Warren; Lampman north to the Brandon-Saskatchewan line of the Canadian Northern; Moose Jaw east to Regina; from a point on the Delisle branch west to the western boundary of Saskatchewan; Chamberlain south to Moose Jaw; Craven northeast to Hudson Bay Junction, with a branch to a point on the Rossburn branch of the Canadian Northern east of Yorkton; Humbolt west to a point at or near Saskatoon; Melfort northeast to the eastern boundary of Saskatchewan; Hudson Bay Junction south to a point on the Brandon-Regina line of the Canadian Northern west of Maryfield; Swift Current north to Battleford; Chamberlain westerly and north of the North Saskatchewan river to the western boundary of Saskatchewan; Prince Albert northeast to the eastern boundary of Saskatchewan; from a point on the Prince Albert-Denholme line of the Canadian Northern west to the North Battleford-Jack Fish line; Moosomin south to the southern boundary of Saskatchewan, and such other lines as may later be authorized. T. Turnbull, assistant chief engineer, Winnipeg, Man.

Canadian Northern Pacific.—A line is to be built from Kamloops, B. C., via Grand Prairie and Vernon to Kelowna, with a branch to Lumby, about 145 miles. The British Columbia government has granted this company $35,000 a mile for the construction of a line on Vancouver Island.

Canadian Pacific.—This company has bought 1,800 acres of land in East Kildon, a suburb of Winnipeg, Man. The site is to be used for new yards. J. G. Sullivan, chief engineer, western lines, Winnipeg, Man.

Additional contracts have been given by the Canadian Pacific as follows: Foley, Welch & Stewart, St. Paul, Minn., for work on about 100 miles from Viceroy, Sask.; John Timothy, Edmonton, Alta., to build from Stirling, Alta., easterly 25 miles, and to W. A. Dutton, Winnipeg, Man., to build from Swift Current, Sask., northwest 80 miles. This branch may eventually be con-

nected with the main line at Bassano. J. G. Sullivan, chief engineer, western lines, Winnipeg, Man.

CANADIAN NORTHERN SASKATCHEWAN.—See Canadian Northern.

CHESTERMERE-CALGARY SUBURBAN.—Work has been started on an 18-mile line to be built from Calgary, Alta. J. A. McCullough, president, general manager and purchasing agent; J. H. Turner, chief engineer, Calgary.

CHICAGO, MILWAUKEE & PUGET SOUND.—An officer writes that contracts are let and work is now under way building a line from Beverly, Wash., down the west side of the Columbia river, through White Bluffs to Hanford. E. O. Reeder, chief engineer, Seattle, Wash.

CHICAGO, MILWAUKEE & ST. PAUL.—An officer writes regarding the report that a connecting line is to be built from Crystal Falls, Mich., west about 20 miles to the Iron River-Stambaugh district that the company has not yet determined to build this extension. C. F. Loweth, chief engineer, Chicago.

CUMBERLAND VALLEY.—An ordinance has been passed granting permission to this company to change its tracks in the southern section of Newville, Pa. G. C. Koons, engineer, Chambersburg, Pa.

CUYUNA NORTHERN.—An officer writes that this company intends to build lines through Crow's Wing county, Minn., to the Cuyuna Iron range, including a line from a connection with the Northern Pacific at Deer Wood, south to Brainerd, about 20 miles, and from Brainerd northeast to a point between Deer Wood and Aitkin, about 25 miles. Some additional branches and spur lines will also be built. The company at present is affiliated with the Northern Pacific. The principal business of the line will be carrying iron ore from the Cuyuna iron range. C. Adams, president, Deer Wood, Minn. (November 3, p. 931.)

DENVER & RIO GRANDE.—Announcement has been made that this company will spend about $15,000,000 within the next two years for betterments and improvements. The Denver shops are to be enlarged, and a large amount of money is to be spent reducing the grades near Soldier Summit, Utah, at the continental divide, and considerable double-track work will be carried out near that place. J. G. Gwyn, chief engineer, Denver, Colo.

DENVER, LARAMIE & NORTHWESTERN.—This road is now in operation from Denver, Colo., to Greeley, 56 miles, and it is the intention of the company to build an extension to the coal fields of Wyoming, in all about 200 miles. Some work on this extension has already been done, including the rock work and the tunnel across the continental divide. W. D. Hodge, general superintendent and chief engineer, Denver, Colo.

ELGIN TERMINAL.—This company has been incorporated in Illinois with $2,500 capital, to build from a point in Will county, Ill., through the counties of Kendall, Kane and Cook, to a point in Lake county. The incorporators include D. C. Dunlap, H. L. Rich, R. S. McCreadie and G. A. Bergtold, all of Chicago.

ELK & LITTLE KANAWHA.—An officer writes that a contract has been given to J. J. Boxley & Son, Rosedale, W. Va., to build a five-mile extension from Rosedale to Tanner; contracts have not yet been let for an 18-mile section from Tanner to Russet. There will be eight steel bridges on the new extension, each 40 ft. long. The company now has 22 miles of track laid between Gassaway and Rosedale. The principal commodities to be carried will be coal and timber. Martin Snyder, president, Cleveland, Ohio, and C. P. Peyton, chief engineer, Charleston, W. Va.

ERIE.—An officer writes that the new double-tracking work on the Chicago & Erie division consist of the second-tracking of the Lima division, from Marion to Huntington, and of the Chicago division from Huntington to North Judson, a total of about 180 miles. In connection with this work grades are reduced from a maximum of .5 per cent. to a maximum of .3 in both directions. On the Meadville division, it is proposed to construct second track and reduce the grades between Concord and Meadville, between mile post 62½ and 101, a distance of 38½ miles, reducing the ruling eastbound grade from 1 per cent. to .2 per cent., and the westbound grade from .95 per cent. to .3 per cent. The new line will be about the same length as the present line. It is also proposed to second-track the line from Salamanca to Jamestown, 33 miles, and reduce the grades between these places from .7 per cent. in both directions to .2 per cent. eastbound, and .3 per cent. westbound. W. J. Harahan, vice-president, New York.

FARMERS GRAIN & SHIPPING COMPANY.—According to press reports, this company, which operates a line from Devil's Lake, N. D., north to Hansboro, 66 miles, is planning to build a branch east to Edmore. Joseph M. Kelly, president, Devil's Lake, N. D.

GRAND TRUNK PACIFIC.—The Grand Trunk Pacific Saskatchewan will ask for authority to build from a point at or near township nine or 10, range 13, west of the second principal meridian to Weyburn, Sask., thence southwest and west to a point on the western boundary of Saskatchewan in townships two to five, in addition to the lines previously mentioned in these columns. B. B. Kelliher, chief engineer, Winnipeg, Man. (March 1, p. 408.)

GRAND TRUNK PACIFIC SASKATCHEWAN.—See Grand Trunk Pacific.

GULF, COLORADO & SANTA FE.—See Atchison, Topeka & Santa Fe.

KARWATHA TRANSPORTATION COMPANY.—Incorporation has been asked for in the province of Ontario to build electric railways in the Karwatha district. One of the lines is to be built from Peterborough, Ont., to Lakefield. The headquarters of the company are at Peterborough.

KENILWORTH & HELPER.—This company was organized in Wyoming, and operates a four-mile line from Kenilworth Junction, Utah, which is about 1½ miles east of Helper, to Kenilworth, and has six miles of line at the two terminals. The company has also been incorporated in Utah, with a capital stock of $250,000. The plans call for building an extension northwest to Salt Lake City, about 100 miles, and an extension east to Vernal, in Uinta county, about 95 miles. Preliminary surveys have been made for some of this work. C. N. Strevell, president and general manager; James H. Paterson, vice-president and treasurer, and F. A. Druehl, secretary. All of the officers are interested in the Independent Coal & Coke Company.

LONDON & NORTHWESTERN.—This company is making plans to build a railway at Rock Glen, near Arkona, Ont., also to build a dam and a power plant at that place. It is estimated that the cost of the work will be $3,000,000. Smith, Kerry & Chase, Toronto, are in charge of the construction work.

LONG FORK RAILROAD.—Incorporated in Kentucky, to build a 20-mile line from a point in Floyd county, through Pike county to the Knott county line. West Virginia capitalists are back of the project.

MEXICO NORTHWESTERN PACIFIC.—See Mexico Northwestern Transportation Company.

MEXICO NORTHWESTERN TRANSPORTATION COMPANY.—This company has been incorporated in Canada, with $25,000,000 capital, by the Mackenzie and Mann interests, and headquarters at Toronto, Ont., to build and operate railways. Application has been made to Parliament for an act authorizing the company to buy and operate railways, tramways, telegraph and telephone lines outside of the dominion of Canada, and to secure concessions from the United States, of Mexico, also to change the name of the company to Mexico Northwestern Pacific Railway.

MISSOURI, OKLAHOMA & GULF.—The plans of this company call for extensions and branch lines as follows: From Henryetta, Okla., west to Oklahoma City; Wagoner, Okla., to Joplin, Mo.; Denison, Tex., south to Dallas and Fort Worth. William Kenefick, president, Kansas City, Mo.

MONTREAL TUNNEL COMPANY, LIMITED.—Incorporated in Canada with $15,000,000 capital, to build railways, steamship terminals, tunnels, approaches, etc. The incorporators include D. McDonald, H. Timmins, D. McMartin, J. Carson, P. Dubee, and other Montreal capitalists.

NEW ORLEANS & GRAND ISLAND.—Incorporated in the province of Ontario, Canada, with $10,000,000 capital, to build railways, canals, etc. Eric N. Armour, Toronto, Ont., is an incorporator.

OKLAHOMA ROADS.—According to press reports, residents of McAlester, Okla., have voted to raise $200,000, for building a 60-mile line from McAlester towards Ada. The work is to be started within two months. C. C. Godwin, Fort Smith, Ark., will build the line.

OTTAWA, SMITH'S FALLS & KINGSTON.—An officer writes that this company was incorporated with $1,000,000 capital, and headquarters at Ottawa, Ont., to build from Ottawa, in the county of Carleton, south via Smith's Falls to Kingston, 106 miles. A branch is to be built from Smith's Falls north to Lanark, about 20 miles. On the first section of 46 miles south from Ottawa, the construction work will be easy, and there will be only one bridge of two 80 ft. spans. On the section from Smith's Falls south to Kingston, 60 miles, there will be considerable heavy rock work, and there will also be one bridge having three 80 ft. spans, one 150 ft. bridge to have either one or two spans, and several smaller bridges ranging from 50 ft. to 70 ft. each in length. The company expects to develop a traffic in dairy and agricultural products, also coal and timber. F. A. Heney, chairman, Ottawa; E. Kidd, vice-chairman, North Gower; G. L. Dickinson, secretary and treasurer, Manotick, and U. L. Upson, general manager, Ottawa.

OZARK LAND & TIMBER COMPANY'S ROAD.—Work is to be started at once on a line to develop timberlands in Benton, Washington and Madison counties, Ark. A camp has been established at the terminal, at Monte Ne, where connection is to be made with the Kansas City & Memphis. The work will include building a bridge over the White river. The Ozark Land & Timber Company was recently organized with $500,000 capital. George D. Locke, Rogers, Ark., is at the head of the project.

PACIFIC GREAT EASTERN.—Incorporation has been asked for in British Columbia to build from Vancouver, B. C., to North Vancouver, thence along Howe sound and following the general course of the Squamish river northeasterly to Lillooet on the Fraser river and along that river north to a junction with the Grand Trunk Pacific at or near Fort George, 450 miles. It is understood that an agreement has been entered into with the Grand Trunk Pacific for the latter company to take over the line on its completion. The incorporators include T. Foley, St. Paul, Minn.; J. W. Stewart, Vancouver, B. C.; D. McLeod, Vancouver; P. Welch, Spokane, Wash.; D'Arcy Tate, Winnipeg, Man., and V. W. Smith, Hazelton, B. C.

PACIFIC & PEACE RAILWAY DEPARTMENT SYNDICATE.—Under this name a French syndicate has been incorporated to complete the organization of a company, to have a capital of $5,000,000. The plans call for building from Dunvegan, B. C., to Bella Coola, over the shortest route between the Peace river and the Pacific coast. A charter was granted last year to the syndicate by the Dominion government to build under the name of the Pacific & Peace River from Bella Coola, B. C., on Burke Channel, to a point at or near Dunvegan, via Fort Fraser, Stewart Lake, Fort St. James, Fort Laclede, and Pine Pass, in all about 480 miles. J. A. Ritchie, Ottawa, Ont., was solicitor for the latter company. (March 31, p. 814.)

ST. JOHN & QUEBEC.—An officer writes that the plans call for building from St. John, N. B., northwest following the valley of the St. John river, via Gagetown, Fredericton, Woodstock, Lakeville, Centerville and Andover to Grand Falls, 210 miles. Arrangements are about completed for the immediate construction of 125 miles from Gagetown to Centerville. Maximum grades will be 1 per cent., and maximum curvature 7 deg. The work from between St. John and Woodstock involves handling about 35,000 cu. yds. a mile, of which 15 per cent. will be rock work. From Woodstock north to Centerville, 23 miles, the work involves handling about 18,000 cu. yds. a mile, of which 25 per cent. will be rock work. A number of small bridges are to be built, and a bridge over the St. John river from 1,200 to 2,000 ft. long, the location of the bridge has not yet been definitely fixed. There will also be about 3,000 ft. of tunnel work near the St. John river crossing. A. R. Gould, president, Presque Isle, Me.; ROSS Thompson, chief engineer, Fredericton, N. B.

ST. LOUIS, IRON MOUNTAIN & SOUTHERN.—This company is carrying out a large amount of improvement work on the lines in eastern Arkansas, across the Mississippi river from Memphis, Tenn. The tracks between Memphis and Wynne, Ark., 46 miles, are being reballasted and put in good condition. As soon as this work is finished the company will probably rebuild the line between Wynne and Knobel, 82 miles. E. F. Mitchell, chief engineer, St. Louis, Mo.

ST. LOUIS SOUTHWESTERN.—An officer writes that there is no truth in the reports that this company is in any way interested in the project to build a line from Hillsboro, Tex., southwest to Whitney, about 12 miles.

SAN ANTONIO, UVALDE & GULF.—An officer writes that a grading contract has been let to Ward & Lee, San Antonio, Tex. All other work will be carried out by the company's men. The plans call for a line from San Antonio, Tex., south via Pleasanton and Campbellton to a point on the Gulf of Mexico, about 140 miles, with a branch to Fowlerton, in all about 200 miles. Maximum grades will be .5 per cent., maximum curvature two deg. The work calls for handling between 12,000 and 15,000 cu. yds. of earth to the mile. E. R. Breaker, chief engineer, San Antonio.

SAN DIEGO & SOUTHEASTERN (Electric).—Incorporated in California with $5,000,000 capital, as a consolidation of the San Diego Southern and the San Diego & Cuyamaca. The San Diego Southern operates a line from San Diego southwest to Tia Juana, 18 miles, and the Colorado Belt Line, 25 miles. The San Diego & Cuyamaca extends from San Diego to Foster, 26 miles. It is proposed to extend the lines to Los Angeles, on the north, and to Ensenada, Lower California, and from San Diego through the Imperial valley to the Gulf of California on the south. John D. Spreckels, Adolph Spreckels, and R. C. Gillis, Los Angeles, are stockholders.

SAN DIEGO SOUTHERN.—See San Diego & Southeastern.

SAN DIEGO & CUYAMACA.—See San Diego & Southeastern.

SAN PEDRO, LOS ANGELES & SALT LAKE.—This company has now under consideration the question of building several branch lines. A contract for building the Ophir branch, 10 miles, in Utah has been let to the Utah Construction Company, and work is to be started on this line at once. The branch from Moapa, Nev., to St. Thomas, 22 miles, will be finished during March. E. G. Tilton, chief engineer, Los Angeles.

SASKATOON TRANSFER.—Incorporation has been asked for in Saskatchewan to build a railway, to use either steam or electricity for the motive power. The plans call for a line from section 23, township 36 to section 26, township 36, range six, west of the third meridian. Borland, McIntyre & Borland, Saskatoon, are the solicitors.

SOUTHERN RAILWAY & NAVIGATION COMPANY.—An officer of this company, which operates a line from Vidalia, La., southwest to Monterey, 22 miles, writes that work is now being carried out by the company's men on an extension of 10 miles. D. K. Jeffris, president and general manager, Pullman building, Chicago.

SOUTHERN NEW ENGLAND.—This company will start surveys at once to determine the most feasible route for the proposed line from Vermont southeast to Boston, Mass. (March 8, p. 454.)

SOUTHERN TRACTION COMPANY.—According to press reports about $5,000,000 has been raised among St. Louis, Mo., capitalists to finance the construction of an interurban electric line from Dallas, Tex., to Waco, including a street system at Waco. G. H. Walker & Co. and William R. Compton Company, St. Louis, are interested.

SPALDING-SPRINGVIEW.—An officer writes that this company has been incorporated in Nebraska with $300,000 capital, to build from Springview, Neb., southeast to Spalding, about 110 miles. Surveys on the section from Bassett to Springview, about 25 miles, is nearing completion. C. E. Lear, Springview, will probably be secretary and treasurer of the company.

SPRINGFIELD WESTERN (Electric).—An officer writes that this company has just completed a preliminary survey for the first section of the Springfield-Joplin line as far as Paris Springs in Lawrence county, Mo., 28 miles west of Springfield. M. Hollenback, chief engineer, Springfield, Mo.

SUDBURY-COPPER CLIFF SUBURBAN.—Incorporation has been asked for in the province of Ontario, Canada, to build from Sudbury, Ont., west to Copper Cliff; also from Sudbury east to Coniston. W. J. Bell, W. Cochrane, J. Mackey, D. M. Morin and L. Laforest, Sudbury, Ont., are interested.

TEXAS ROADS (Electric).—Residents of El Paso, Tex., are interested in a project to build a line from that place east to Ysleta, 12 miles.

UPALIKA & SOUTHERN.—Incorporated in South Dakota, with $100,000 capital, and offices at Pierre, S. D., at Upalika, Mo., and at Chicago. The company plans to build a 10 mile line connecting Upalika, Mo., and Flintville. The incorporators include T. Graham, E. P. Flint, and E. C. Talmage, Chicago, and J. W. Laughlin, Pierre.

UTAH COAL RAILWAY.—According to press reports, this company, which was incorporated in Utah early this year with $125,000 capital, will start work in April on a line from Provo, Utah, via Springville and Huntington, to Mohrland, where connection is to be made with the Castle Valley. The new line will be 90 miles long, and will provide an outlet for coal from the mines of Carbon and Emery counties. W. M. Bradley, president; William Ashton, vice-president, and R. B. Harkness, secretary and treasurer. (February 9, p. 263.)

WESTERN CANADA POWER COMPANY.—Plans are now under consideration for building along the north shore of the Fraser river from Mission Junction, B. C., west to Vancouver, about 40 miles. Much of the right of way has been secured. W. Neill, assistant manager, Vancouver.

WINNIPEG ELECTRIC.—This company has plans made for building an extension from Middle Church, Man., north to Stony Mountain and Stonewall, about 15 miles. Wm. MacKenzie, president, Toronto, Ont.

## RAILWAY STRUCTURES.

ABERDEEN, WASH.—A contract for the construction of a union passenger station, to cost approximately $75,000, to be used by the Oregon-Washington Railway & Navigation Company, the Northern Pacific and the Chicago, Milwaukee & Puget Sound, has been let to Grant, Smith & Company of Spokane, Wash.

BARNESVILLE, GA.—An officer of the Central of Georgia writes that plans for a new station at Barnesville, Ga., have not been completed, as the size and location have not yet been fully determined.

BARSTOW, CAL.—An officer of the Atchison, Topeka & Santa Fe Coast Line writes that a 25-stall roundhouse and trackage, water and drainage system will be constructed at a cost of approximately $133,000, to replace structures destroyed by fire June 23, 1911.

BUFFALO, N. Y.—The Buffalo Creek has adopted the Strauss bascule bridge design for a 165-ft. single leaf, double-track bridge over the Buffalo river.

COQUITLAN, B. C.—The Canadian Pacific will begin work this year on the construction of one unit in the proposed terminal plant at this point, including a roundhouse, car repair shop, paint shop, machine shop and several smaller buildings. The complete plans include four or five similar units.

DENVER, COLO.—The shops of the Denver & Rio Grande are to be enlarged.

DOCTORTOWN, GA.—The Atlantic Coast Line has adopted the Strauss bascule bridge design for a 117 ft. 6 in. single leaf, single track span over the Altamaha river.

GOLDSBORO, N. C.—See Raleigh.

GRAND RAPIDS, MICH.—The track elevation commission appointed by the city of Grand Rapids, Mich., on March 1, 1911, to consider the elevation of the railway tracks through the city and work out plans and estimates for this work, has completed its report and submitted it to the city council. The commission, consisting of City Engineer Cutcheon, representing the city; E. H. Barnes, representing the railways, and Consulting Engineer E. N. Layfield, recommended the elevation of all railway tracks in the city, with the exception of the Michigan Central, Grand Rapids & Indiana and Pere Marquette tracks south of Wealthy avenue, over which tracks viaducts were favored. Eight viaducts were recommended at an estimated cost of $970,000; and the elevation proper is estimated to cost $4,115,000, or a total for the entire grade separation work of $5,085,000. This comprehensive study is the outgrowth of an agitation for grade separation starting about eight years ago, and was undertaken in order to insure that any work done would fit in with a comprehensive plan for the ultimate separation of all grade crossings. It is not expected that actual construction work will be undertaken for some time.

HALIFAX, N. S.—Plans have been made for putting up a new station and freight sheds for the Intercolonial Railway and the Dominion Atlantic at Halifax. The improvements include an extensive scheme of railway yards, terminals, bridges, freight sheds and a union station, also the construction of subways, the alteration of docks, and the removal of old buildings. (July 28, p. 199.)

HILLSBORO, TEX.—Preparations are being made for the construction of a joint passenger station for the Missouri, Kansas & Texas, and the Trinity & Brazos Valley.

LAUREL, MISS.—An officer of the Queen & Crescent writes that the company has under consideration the question of building a modern passenger station at Laurel, Miss., but will not take any definite action in the near future.

LOS VACAS MEX.—Surveys have been made for the proposed international railway bridge to be built over the Rio Grande, to connect Los Vacas with Del Rio, Tex. This bridge is to be used jointly by the National Railways of Mexico, and the Kansas City, Mexico & Orient. A branch is now being built by the N. R. of M., from Allende north to Los Vacas, about 75 miles, and the Kansas City, Mexico & Orient is building a branch from San Angelo, Tex., south to Del Rio.

MACON, GA.—An officer of the Central of Georgia writes that improvements, including additional tracks at the Macon yards, have been finished.

MEMPHIS, TENN.—Work is expected to be started early this year on the construction of a new passenger station to cost approximately $1,500,000 to be used by the Illinois Central, Chicago, Rock Island & Pacific and St. Louis & San Francisco. The contract has not been let. Construction is now in progress on another station to be used by the Louisville & Nashville, Nashville, Chattanooga & St. Louis and the Southern.

MONTREAL, QUE.—The Central Railway of Canada has made plans for putting up a new station and terminals in the eastern section of Montreal. The company recently let a contract to build a line from Montreal to Ottawa.

PRINCE RUPERT, B. C.—Contracts have been let by the Grand Trunk Pacific for excavations for the proposed dry dock, terminals and hotel. The entire plan calls for an expenditure of $5,000,000.

RALEIGH, N. C.—Following the announcement recently made by President W. W. Finley, of the Southern Railway, that modern freight terminals would be constructed at Raleigh and at Goldsboro, the company is now asking for bids for the construction of a brick freight warehouse and office building 300 ft. x 50 ft., to be built at Raleigh, and has let the contract for the construction of a brick freight warehouse and office building 228 ft. x 50 ft. at Goldsboro, to J. P. Pettyjohn & Co., of Lynchburg, Va. The improvements to be made at Raleigh, in addition to the building proper, will include the construction of 9,100 sq. ft. of new platform, 3,700 sq. yds. of macadam driveway, the rearrangement of present tracks and the construction of 1,960 lineal feet of new tracks. For the new freight terminal at Goldsboro 5,500 sq. ft. of new platform, 4,800 sq. yds. of macadam driveway and 1,385 lineal feet of new tracks will be provided.

SAVANNAH, GA.—According to press reports, the Savannah Electric Company will construct a power plant at Savannah, to have a capacity of 11,000 k.w. The work will be begun soon, and it is said will be finished by November.

SIMPSON, IND.—Plans are being made by the Cincinnati, Bluffton & Chicago for a combined freight and passenger station to be built at Simpson.

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The Longitudinal Railway, Chile, is being built by English contractors. It is expected to be completed within two years. Construction work was begun in January, 1911, and 150 miles have already been completed. This line, which runs from Arica to Pueblo Hundido, will have a total length of about 500 miles. It will run through desert country to a large extent, but at the same time it will open up valuable mineral regions, such as Taltal, Antofagasta and Tocopilla, where there are large nitrate deposits. The cost of this railway is estimated to be $15,000,000.

# Railway Financial News.

Atlanta, Birmingham & Atlantic.—It is understood that arrangements are now being completed to take care of the $6,239,200 5 per cent. collateral trust two-year notes of the Atlantic & Birmingham Construction Co., which are due May 1. These notes are a joint obligation of the construction company and of the railway company, and it is probable that they will be renewed for three years and that additional collateral will be deposited to secure them.

Bellingham Bay & British Columbia.—See Chicago, Milwaukee & Puget Sound.

Chesapeake & Ohio.—The New York Stock Exchange has listed $374,000 additional general mortgage 4½ per cent. bonds and given authority to add $1,126,000 bonds on notice of sale. The bonds are issued at the rate of $25,000 per mile on account of double-tracking.

Kuhn, Loeb & Company and the National City Bank, both of New York, have bought $3,500,000 4½ per cent. notes, due 1914. These notes are part of an authorized issue of $25,000,000, of which $16,000,000 have previously been sold. Of the proceeds of these notes, $1,750,000 will be used to pay for 2,000 coal cars and 50 locomotives recently bought, and the remainder will be for general improvement purposes. The double-tracking of the line is nearly complete, it is understood.

Chicago & Western Indiana.—The New York Stock Exchange has listed $1,365,000 additional consolidated mortgage 4 per cent. bonds of 1902-1952. The proceeds of the sale of these bonds are to be used by the company as follows: $540,000 for the bridge over the Calumet river, track elevation, and additions to the Belt division; $398,000 to repay to proprietary companies bonds cancelled in March, 1911; and $426,900 for construction and capital betterments.

Chicago, Indianapolis & Louisville.—Redmond & Company and the Equitable Trust Company, both of New York, are offering $2,500,000 first mortgage sinking fund bonds of the Monon Coal Company, of 1911-1936 at 94, yielding about 5½ per cent. income on the investment. Interest is guaranteed unconditionally by the railway company.

Chicago, Milwaukee & Puget Sound.—Kuhn, Loeb & Company, New York, have bought the Bellingham Bay & British Columbia, 55 miles, in the interests, it is understood, of the C. M. & P. S.

Denver & Rio Grande.—The directors have voted to issue $25,000,000 20-year adjustment mortgage 7 per cent. cumulative income bonds. Bankers have underwritten $10,000,000 of these bonds and stockholders are offered the privilege of subscribing at par. The bonds are callable at 115, but there is no provision for their conversion into stock or other securities. President Bush is quoted as saying that about $7,000,000 will be spent on the property in 1912. Shops will be enlarged at Denver and terminals will be enlarged at Pueblo, Salida, Minturn, Grand Junction and other points. About $1,800,000 will be spent at Soldier Summit, the continental divide. It is estimated that the work of rehabilitation will take until about 1915.

Jonesboro, Lake City & Eastern.—This company, operating through Eastern Arkansas, has recently bought the Wilson & Northern, extending about forty miles northwest from Memphis, Tenn. R. E. Lee Wilson, of Memphis, Tenn., was the owner of the Wilson & Northern.

Kansas City, Mexico & Orient.—Edward Dickinson, vice-president; J. O. Davidson, of Wichita, Kan., and M. L. Turner, of Oklahoma City, have been appointed receivers of the K. C. M. & O.

The Columbia Trust Company, New York, asks the deposit of bonds and stocks of the K. C. M. & O., of the Kansas City Outer Belt & Electric, the International Construction Company and the Union Construction Company with it, in view of the fact that a protective committee has been formed representing both English and American security holders' interests. The protective committee consists of Lord Monson, chairman; C. Braithwaite, Granville Farquhar, Frederick Hurdle, Harry Bronner, Willard V. King, L. F. Loree, H. P. McIntosh, T. P. Shonts, George A. Touche, M. F. Warfield and E. Davis Warfield.

See editorial comments on the receivership in another column.

Lake Shore & Michigan Southern.—See Pittsburgh & Lake Erie.

Missouri Pacific.—J. M. Metcalf and Jay Gould have been elected directors, succeeding H. I. Miller and B. F. Edwards, resigned.

New York Central & Hudson River.—This company has applied to the New York Public Service Commission, Second district (up state), for permission to buy the stock of the Rome, Watertown & Ogdensburg at $128 per share, and has asked permission to buy the outstanding stock of the Utica & Black River at $180 per share. The R. W. & O. has $10,000,000 stock outstanding, of which the New York Central, at last reports, did not own any. The Central leases the road, pays its interest charges and taxes and 5 per cent. on the stock. The R. W. & O.'s funded debt amounts to $10,775,000. The Utica & Black River has $2,223,000 stock outstanding, of which $1,120,000 is owned by the R. W. & O., and is leased to the R. W. & O., which pays interest charges and taxes and 17 per cent. on the stock. The R. W. & O. also leases the Carthage, Watertown & Sackett's Harbor, the Niagara Falls Branch Railroad and the Oswego & Rome Railroad.

To finance its proposed purchases, the New York Central & Hudson River asks the commission to approve of the sale of $16,667,000 4 per cent. debentures of 1912-1942 at not less than 90; or, as an alternative, the sale of $15,000,000 4½ per cent. 3-year notes at not less than 98½.

See also Pittsburgh & Lake Erie.

Pennsylvania Company.—This company has sold to the Union Trust Company of Pittsburgh $10,000,000 series E Pennsylvania Company 4 per cent. collateral trust bonds. The bonds are guaranteed by the Pennsylvania Railroad and are secured by an equal amount par value of Pittsburgh, Fort Wayne & Chicago guaranteed special 7 per cent. stock. The bankers are offering the certificates at 97½, yielding about 4.12 per cent. income on investments.

Pittsburgh & Lake Erie.—This company and the Lake Shore & Michigan Southern have made a joint offer to buy the $3,959,650 outstanding stock of the Pittsburgh, McKeesport & Youghiogheny. The price offered is $65 per $50 share. The road is leased to the P. & L. E. for 6 per cent. on its stock, which 6 per cent. is guaranteed by the Lake Shore & Michigan Southern.

Pittsburgh, McKeesport & Youghiogheny.—See Pittsburg & Lake Erie.

Portland Terminal.—This company has voted to increase its capital stock from $500,000 to $1,000,000. The company is controlled by the Boston & Maine and Maine Central.

St. Louis Southwestern.—The Guaranty Trust Company of New York is offering a block of Stephenville North & South Texas first mortgage 5 per cent. bonds of 1910-1940 at 97½.

Toledo, St. Louis & New Orleans.—Stockholders have voted to sell that part of the road from Effingham, Ill., to Carmi, with a branch line from Clay City to Benton, to the Chicago, Paducah & Thebes Railway, and that part of its line from Carmi to Brookport to the Gulf Lines Connecting Railroad.

## FOREIGN RAILWAY NOTES.

An important railway, soon to be built, will run from Tupiza, Bolivia, to La Quiaca on the Argentine frontier, there to connect with the Argentine Central, now in operation, and thus establish a direct service from La Paz to Buenos Aires, Argentina. It is estimated that the Tupiza-La Quiaca line will be completed within two years.

A railway is proposed in New South Wales from Wyalong to Hillston via Rankin's Springs, and another from Ryalong via Ungarie to Lake Cudgellico. The Rankin's Springs route will be 110 miles long and it is estimated it would cost $1,758,675, or $15,935 per mile of 60-lb. rail. The ruling grade would be 1 per cent., and the sharpest curve would have a 440-yd. radius. The Lake Cudgellico route would be 125 miles long, and it is estimated that it would cost $2,176,835, or $17,400 per mile.